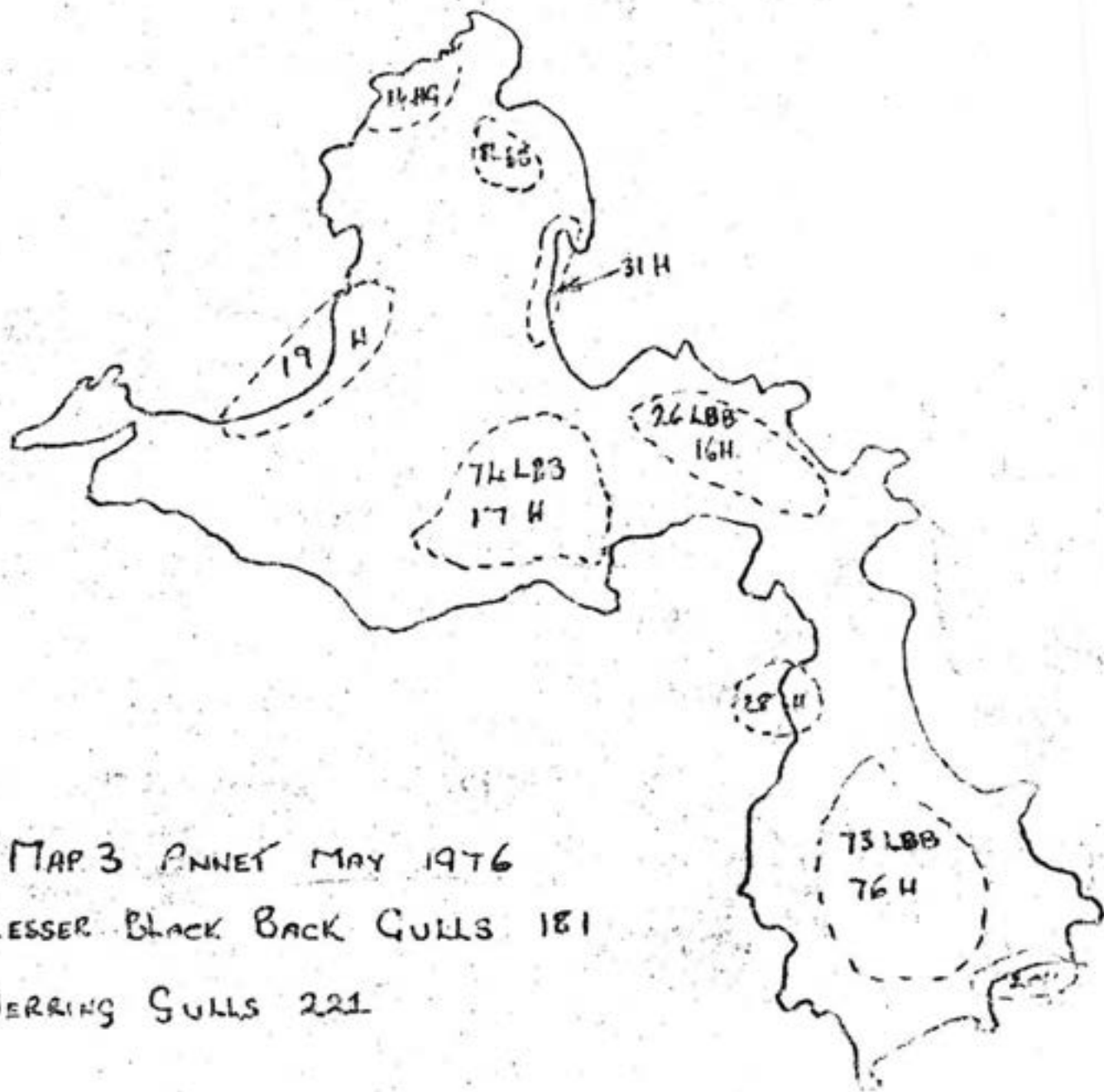




MAP 3 PINNET MAY 1976

LESSER BLACK BACK GULLS 181

HERRING GULLS 221

TRAP 2. MOUNT MAY 1976

Puffins 25
Puffins 6
SHAG 129
Litter 2

TRAP 1

SHAG 11

SHAG 14

SHAG 11

SHAG 34

1 Litter

SHAG 34

6 Puffins

5 Puffins
2 Litter
8 SHAG

SHAG 11

SHAG 11

SSA

SSA

1976
General Black
Back Gull
Russet May 1976
1070 360

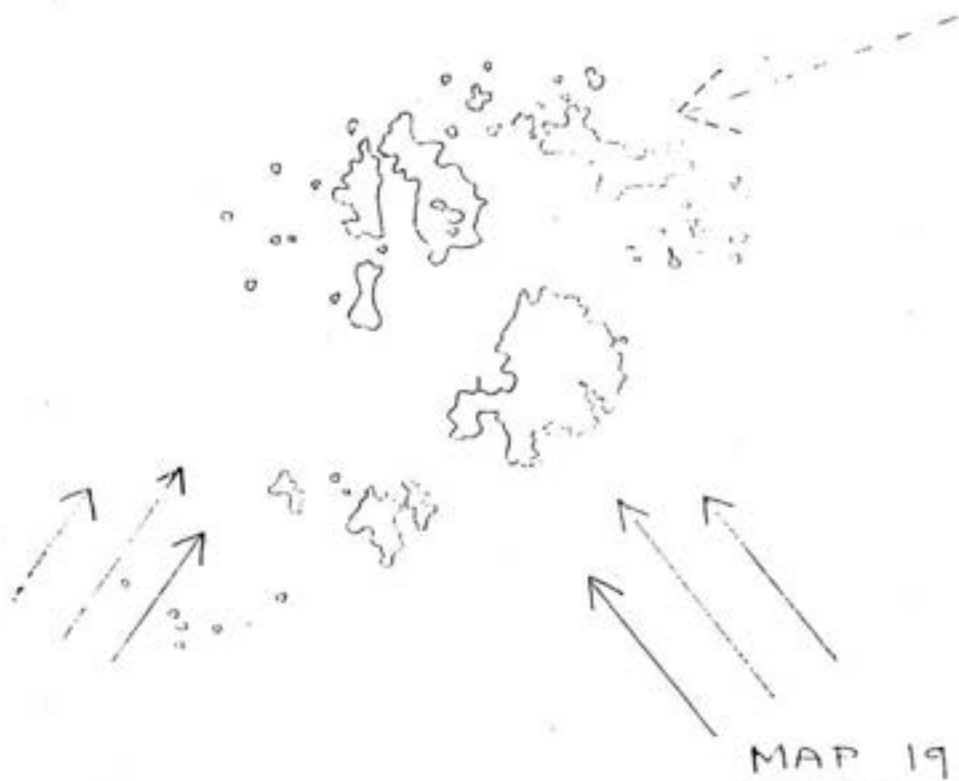


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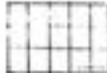
RETURNING TO COLONIES EVENINGS 1974: -

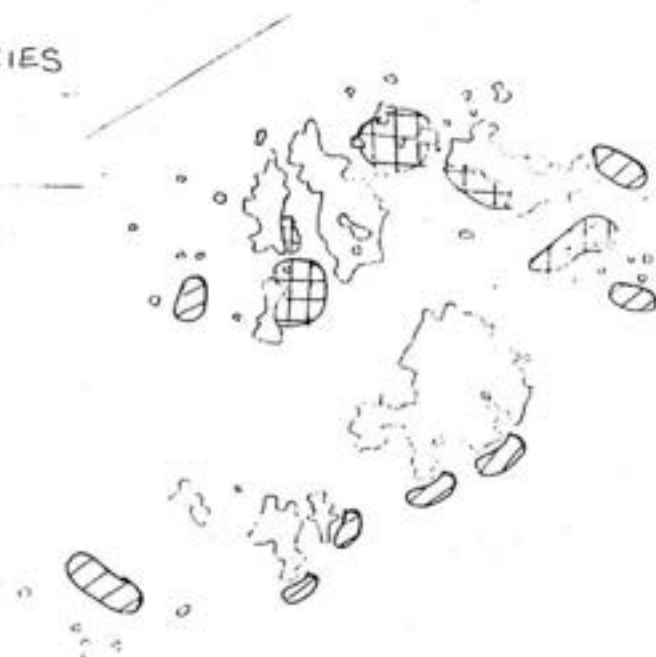
DOTTED ARROW REFERS TO IRREGULAR FLIGHT LINE



MAJOR INSHORE FEEDING AREAS FOR HERRING AND GREAT
BLACK-BACKED GULLS 1974

 FISH SPECIES

 INTERTIDAL
SPECIES



GREAT BLACK-BACKED GULL: CONSTITUENTS OF DIET

JUNE - JULY 1974

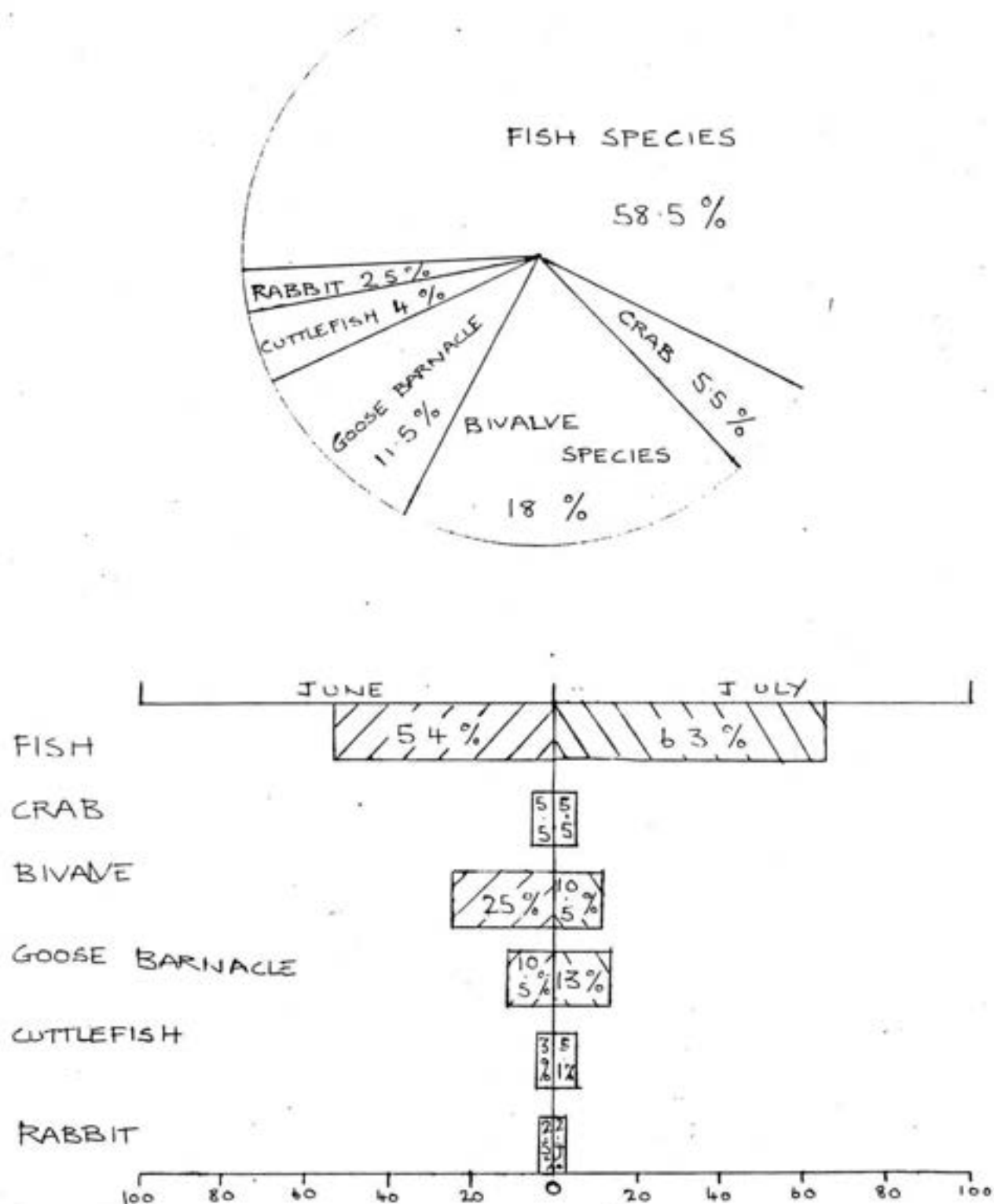


FIGURE 6

HERRING GULL: CONSTITUENTS OF DIET JUNE - JULY 1960

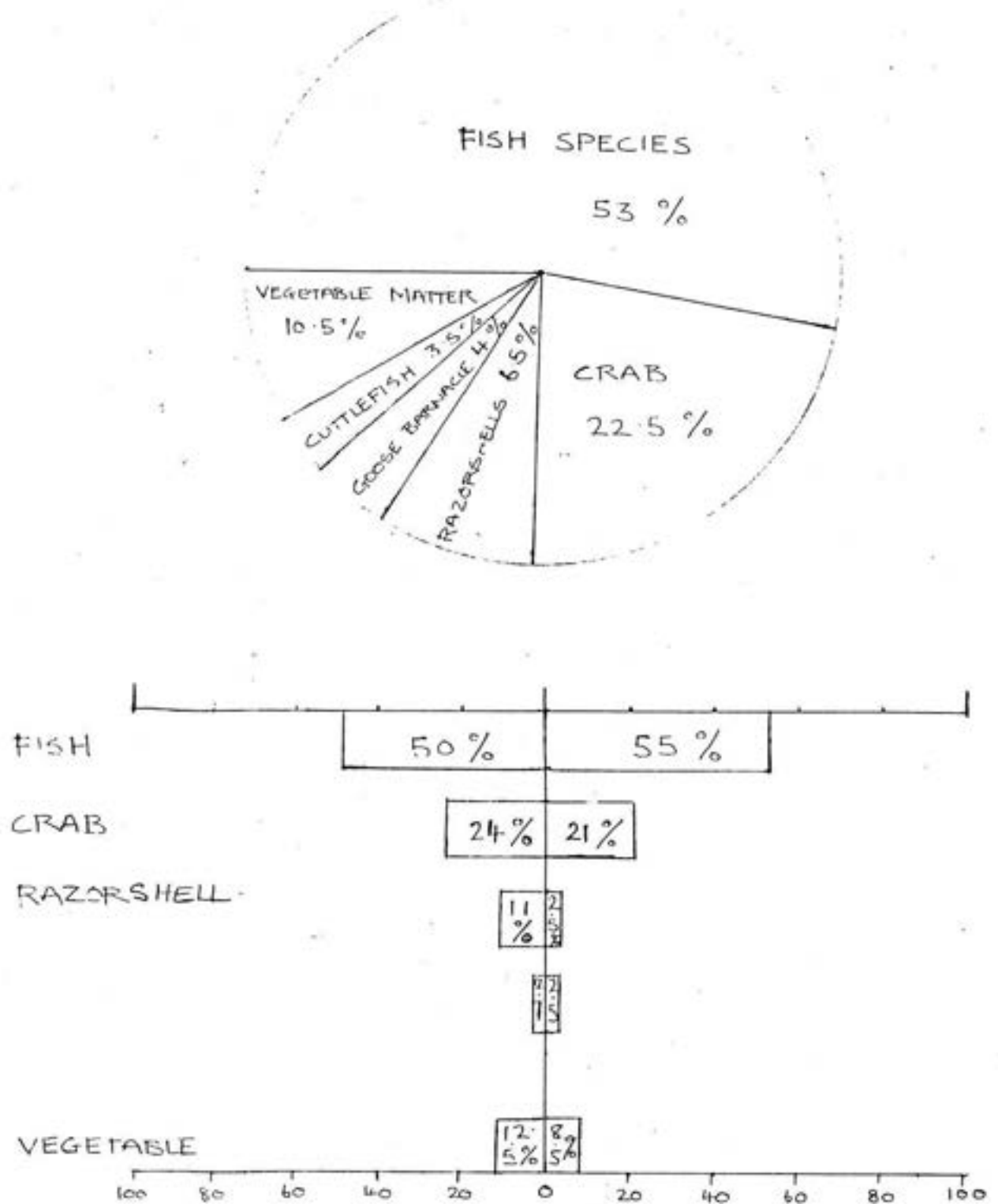


FIGURE 5

JUNE - JULY 1974

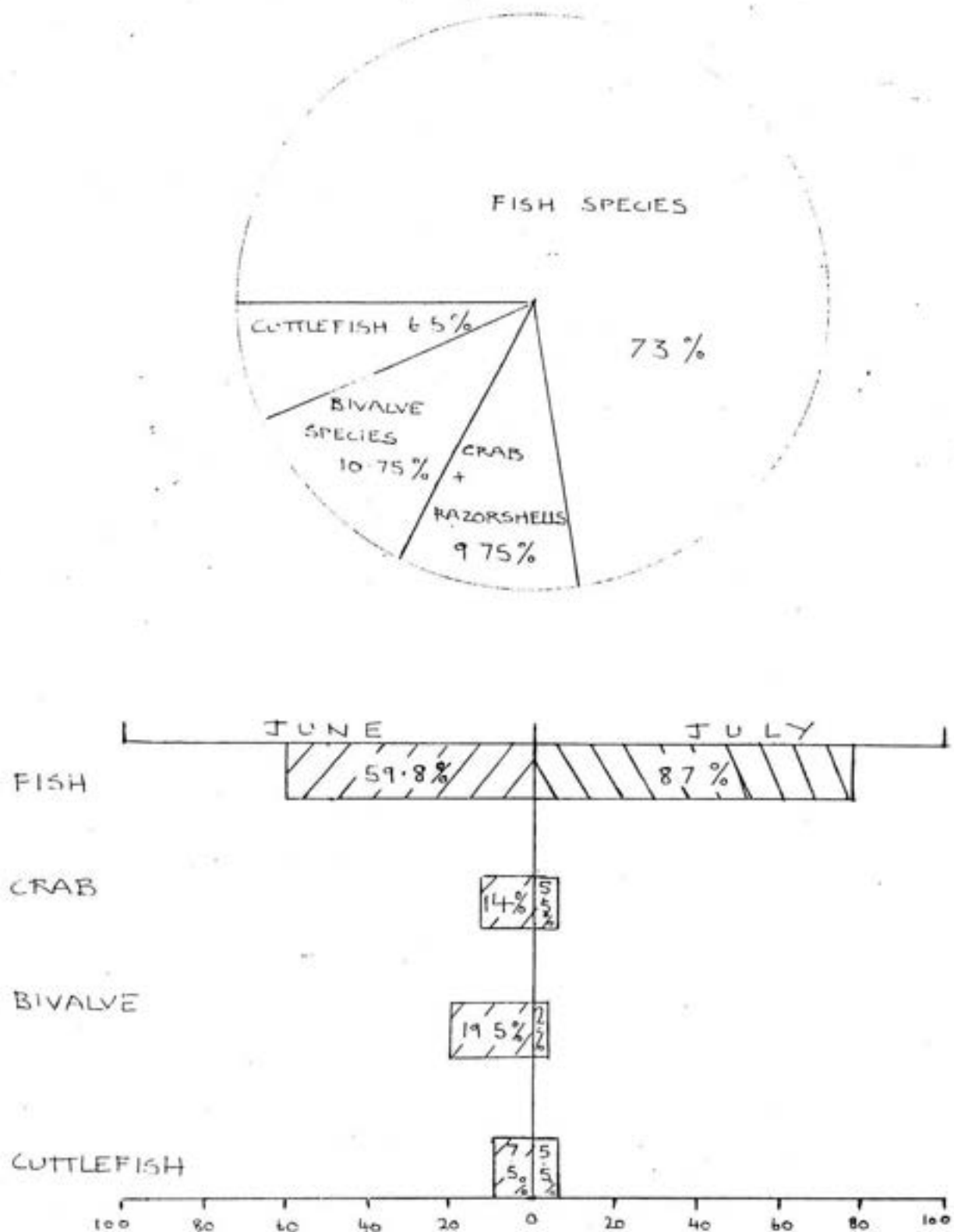


FIGURE 4

At colonies such as Annet and St Helens Great Blackbacks preyed on Rabbits, and on St Helens and Samson clear preferences for this food were evident from the remains littered around individual nests. Such birds clearly took advantage of the many young and largely helpless animals around during the breeding season, and there was no evidence from casts collected that adult Rabbits were consumed, most probably because of difficulties presented by their larger size and better developed survival skills. Rat remains were also found on Great Arthur and Samson, but these are not present at most of the Great Blackback breeding stations and so represent only an incidental food source. Single casts of grain and beetles were discovered on Annet: feeding inland on arable, or uncultivated land is rare in Scilly, and observed only very occasionally.

GREAT BLACKBACKED GULL

In contrast to Lesser Blackbacked and Herring Gulls, Great Blackbacks feed mostly in inshore waters. While small numbers, not more than 50, most probably scavenge from trawlers further out to sea - see page 81, most birds feed on the tidelines within 5 miles of land, often accompanied by Herring Gulls. The main areas where this type of feeding was observed in 1974 are shown on Map 19A. No regular feeding flights were noted of birds returning from out at sea until mid-July, when small parties passed north eastwards on many evenings between Annet and the Bishop Rock Lighthouse, and throughout the summer feeding parties were continually present offshore around the islands. Although at many sites in Britain Great Blackbacks are heavily dependant on man for fish, there is little doubt that in Scilly most birds specialise in surfacing shoals and are independent of the islands' limited fishing industry: for example, from late June onwards mackerel formed the bulk of all fish taken, but local fishermen stated that these and similar gadoid species were less abundant than in previous summers, and smaller numbers were caught.

To a certain extent Great Blackbacks do benefit from man's activities. Small numbers follow returning fishing boats and shellfish crafts, although the pickings are confined to limited quantities of used bait, etc., and do not constitute more than a supplement to the usual diet; similarly, a few birds, maximum 16, frequented Hugh Town refuse tip over the summer months, while up to 20 would visit the harbour for scraps and chance takings from returning boats and visitors. As with Herring Gull feeding habits in relation to man, in all the above cases numbers concerned varied little and seemed to involve the same individuals day after day: in late June a line of feathers inadvertantly jettisoned from a shellfish boat in the Eastern Isles was swallowed by a Great Blackback, and as a direct result the usual flock of c35 attentive gulls was absent for the following 6 days, strongly suggesting that numbers exploiting these food sources are fixed according to the limits on offal available.

As mentioned on page 69, poor weather probably had less effect on Great Blackbacks than on Lessers. Conditions suitable for inshore shoaling fish would probably be less susceptible to rain and gales than further out to sea, and at Porth Hellick Bay on St Mary's, where up to 30 Great Blackbacks from the Eastern Isles specialised on shoals of mullet from May onwards, feeding activities continued even in gales of up to Force 8. However, along with Lesser Blackbacks Greats took considerable numbers of bivalve species during the first half of the breeding season, probably as alternatives to fish in the event of shortages following poor weather or variations in the quantities of exploitable stocks. The higher incidence of Goose Barnacle consumption in July compared with June related to more marked southerly and westerly winds bringing greater numbers inshore on drift wood and similar floating refuse from the southern approaches to the English Channel.

Small amounts of crab, cuttlefish and other intertidal foodstuffs were also taken. On Annet more crab remains were found in the standing grounds and middens in the first half of June than at other times, when many pairs clearly fed their chicks largely on crab meat. However, taking the islands as a whole, at many large gull colonies in the Eastern Isles and around St Helens and St Martin crabs were a regular feature of the Great Blackback diet, most probably because of their abundance in the intertidal zones nearby - see Map 19A. Most examples were of the Shore Crab, but specimens of Edible Crab and of Velvet Shore Crab were found on Annet and Rosevear respectively.

cases of this, and at the main source of exploitable garbage, Hugh Town rubbish tip, Lesser Blackbacks were erratic and solitary in their appearances. Although odd birds were sometimes seen following the plough on St Mary's, feeding on arable or semi-arable land was also rare and exceptional.

HERRING GULL

Of the three gulls studied in 1974, the diet of Herring Gulls was the most catholic and showed most variation from site to site. Fish constituted a smaller percentage of all food taken, while intertidal prey was more important. Unlike the other two species, Herring Gulls depended on vegetable matter, usually in the form of grain, to a significant extent.

Most fish was taken out at sea, as with the Lesser Blackback, both species used the same flightlines each evening, and Herring Gull casts of fish closely resembled those from Lesser Blackbacks. It would seem therefore both feeding areas and food taken overlapped with those of their close relatives, which presupposes an abundance of readily available food.

Herring Gulls also feed regularly around trawlers within reach of the Scillies, mostly on the liver and guts of commercial fish but also on non-commercial species like pout and whiting that are tossed overboard by the trawlermen. Flocks of Herring Gulls around the boats usually number about 400 birds, and apparently move from one vessel to the next, their arrival always coinciding with gutting on board. Numbers do not diminish in bad weather, and even in gale force conditions the gulls will not abandon the boats if gutting is in progress. It is especially interesting to note that numbers of attendant birds do not vary according to the time of day, or night: their presence is determined by the quantities of liver and guts flushed out the stern and not by other factors. Pickings are obviously excellent: deck hands say that Herring Gulls so bloated with food that they cannot alight on the ships' rails are a common sight.

Intertidal food is taken on a significant scale, and at sites like Puffin Island and Northwethel, which are surrounded by sand and mud at low tide, crab, razorshells and cuttlefish formed the bulk of the residents' diet. Casts at more marine islands like Annet, Rosevear and Melledgen were predominately of fish, reinforcing the way in which easy access conditions the feeding habits of this species.

Man-assisted food also played a major part in Herring Gull feeding activities. Up to 50 birds were seen, following tractors at farms on St Mary's, usually when poor weather had inhibited feeding offshore, but most food came from the islands' refuse disposal systems. Up to 250 birds regularly frequented Hugh Town rubbish tip in May, June and July: around 50 were daily at the sewage outfall off the Garrison on St Mary's, while three times as many fed off refuse in the bay at Old Grimsby, Tresco. Numbers at all sites varied little over the summer, apart from fluctuations in the course of each day, and evidence from casts collected showed that the birds involved specialised almost exclusively on this food supply, and the limited quantity available precluded competition from visiting birds in bad weather, etc.

LESSER BLACKBACKED GULL

Lesser Blackbacks in Scilly mainly feed considerable distances out to sea, the major flight lines of birds returning to their colonies are shown on Map 19, and these involved an estimated minimum of 800 individuals each night throughout the summer months. Lesser Blackbacks did not in general return socially, but singly, or in twos and threes; however, from early July onwards small parties flying in formations of up to 20 birds were noted, probably correlating with breeding progress and especially with reduced food demands if young had not survived.

The exact feeding areas were not located: they lie at least 12 miles + offshore, well beyond the range of local fishermen from the islands. From the fairly constant orientation of returning birds it would seem that they are fixed and offer regular quantities of exploitable fish. I would guess that these lie to the south and west of the Wolf Rock Lighthouse, and around the Pole Bank to the south of the Bishop Rock Lighthouse: further research, which would involve visits to this area, is needed to confirm this deduction.

Offshore feeding at such distance necessitates spending considerable time travelling to and from the food supplies. In the process they are often hampered by poor weather, and in particular by poor visibility, which consistently delayed departures from the breeding colonies and expedited the arrival of returning birds. Strong rain and winds had little apparent effect on the gulls' abilities to reach their feeding grounds, but most probably caused shortages of exploitable fish in the usual places. Most fish species are undoubtedly taken as they surface in shoals, and hot calm days would be ideal for this: significantly, during such times few if any gulls not involved in incubation/hatching duties were present in the colonies, while in wet, less suitable feeding conditions numbers of second or loafing birds were often high. Trawlersmen from Newlyn report that small numbers of 'Blackbacks' sometimes scavenge for offal from fishing boats around the Scillies. Observations on birds following trawlers off North West Scotland and in the Irish Seas have shown Lesser Blackbacks to be much the rarest of the three relevant *Larus* species in these situations, and there is no evidence to suppose that behaviour in the South West is any different. Confusion may well have occurred with Great Blackbacked Gulls, which in many parts of Britain depend largely on offal from trawlers, and few atypical fish casts that might have originated from rejected, non-commercial fish were found in the Lesser Blackbacks feeding areas.

Intertidal feeding within the islands was very limited. Small quantities of crab, razor shells and cuttlefish were taken, but these did not amount to a notable percentage of the total food consumed, especially in terms of food value rather than food units. In general, Lesser Blackbacks feeding on tidal flats were a rare sight, always concerning no more than 5 or so birds at any one time. Some food was taken on the rocks around the breeding areas, and this most probably included the bivalve species that comprised 10.75 of the birds' diet. These as yet unidentified organisms clearly constituted a poor weather alternative to fish during May, when shoals were reported by fishermen to be less numerous than in previous summers; a similar pattern of fish alternating with bivalves was prevalent in the Great Blackbacks' diet at this time.

Local people say that in the last few years Lesser Blackbacks have started to exploit waste food, either in the form of garbage or titbits from holidaymakers, around the islands. During 1974 I saw very few

correspondingly sizeable. However, processing and canning takes place on board rather than in port, and so the self-sufficient and closed nature of the system may mean that offal is minimal.

There is no evidence that gulls from Scilly feed in West Cornwall during the breeding season: the distance involved, some 28 miles, precludes this, as does the large numbers of resident gulls that exploit such choice feeding areas as Newlyn Harbour and St Ives Bay. The majority of food in Scilly during the summer months is therefore taken 'naturally' and not through the assistance of man. The past history and common increase in the three gull species shows that fish and other relevant stocks have for many years been ample for the birds' needs. This in many ways contradicts the accepted estimate of the Scillies as a fishing ground: most local people and visitors agree that fish are generally rather scarce, though causes for this are much disputed. Objective assessments of numbers are however difficult, but of the two most numerous gadoid species pollock have probably declined in the last 20 years and the dramatic increase in line-fishing for mackerel around the islands in recent times may not have been matched by a greater abundance of the actual fish. But it should be remembered that the vagaries of weather and the location of fish stocks effect man's activities more than the gulls, and quantities of commercially viable fish may represent only a small fraction of the amount of fish accessible to gulls.

THE FEEDING ECOLOGY OF LARUS GULLS IN SCILLYINTRODUCTION

During late May, June and July 1974 the diet of Lesser Blackbacked, Herring and Great Blackbacked Gulls was studied in Scilly. Collections were made of representative dry good samples from the three species, and these were supplemented by notes on the relative abundance of the different items consumed. These varied according to weather, tide and the breeding progress of individual pairs, and these influences, together with precise identification of the fish and bivalve species involved, will be discussed and analysed at a later date. Conclusions are therefore tentative at present, but the descriptions given in the following four pages should form a general if not highly detailed picture of some aspects of the feeding ecology of gulls in Scilly.

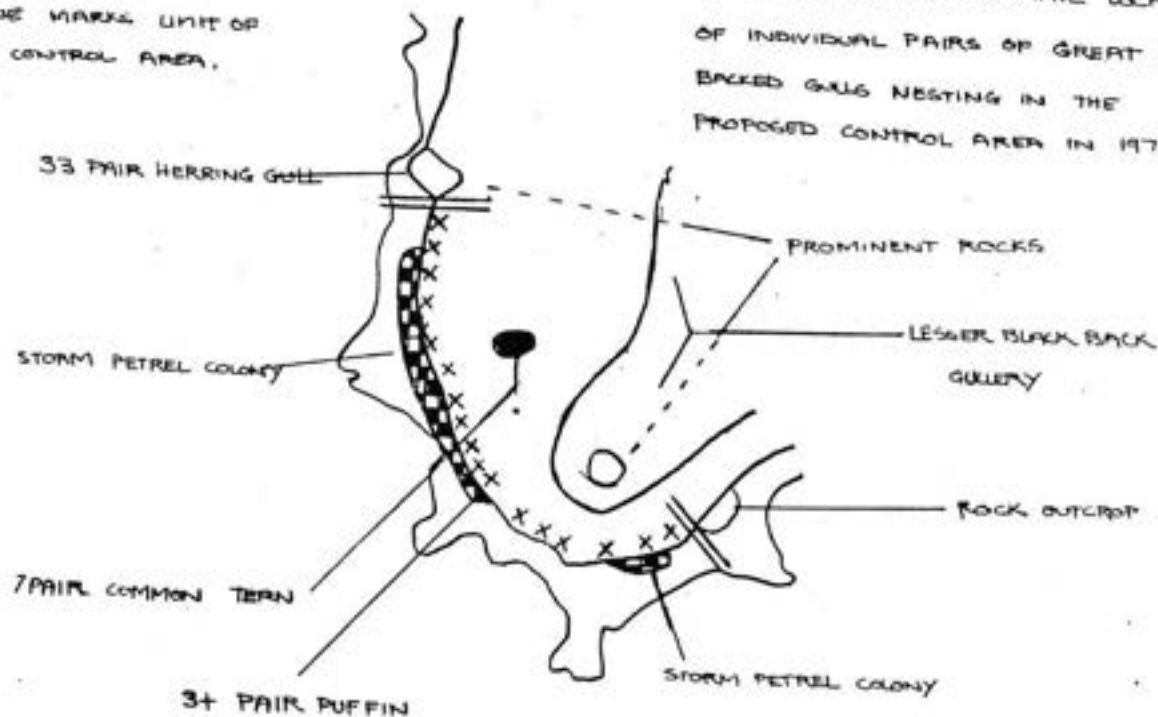
Research in many parts of the British Isles has shown that feeding habits vary considerably according to local conditions. In Pembrokeshire for example, Herring and Great Blackbacked Gulls subsist largely on offal and waste from the fish docks at Milford Haven; gulls from the large colonies on islands in the Bristol Channel feed mostly at the rubbish tips of Cardiff and especially Bristol; in North Western Scotland the increasing populations of Great Blackbacks exploit waste from offshore trawling fleets, as they do in Anglesey and North Wales; at their vast colonies in Lancashire a major source of feed for Lesser Blackbacked Gulls is arable land.

The Scillies support about 10% of the Lesser Blackbacked Gull population of England and Wales, about 2.5% of the Herring Gull population, and over 40% of Great Blackbacks breeding south of Scotland. In contrast to the areas mentioned above, quantities of man-assisted food in Scilly are strictly limited. Garbage is confined to the rubbish tip outside Hugh Town on St Mary's and sewage outfalls at the Garrison and Old Grimsby, Treco, while the amounts of exploitable waste have risen because of increased tourism in the islands and disposal methods remain generally inefficient, the quantity involved does not in any way compare with mainland situations. Commercial fishing around the islands is likewise on a small scale only one vessel from St Mary's specialises in commercial trawling, and there are in addition a maximum of thirty to forty less regular boats that fish for shellfish, ray, flatfish and in particular mackerel: as described below, offal from this source is restricted both by the part time nature of these ventures and by the need, especially in shellfish potting, to use what might otherwise be considered waste as bait for tomorrow's work. Rather more significant in terms of food for gulls are the activities of trawlers offshore: during 1974 some twelve to eighteen boats from Newlyn, occasionally boosted by others from more distant West Country ports, trawled the Wolf grounds and other areas within twenty miles of the Scillies. Offal, mostly in the form of liver and guts but also including smaller quantities of non-commercial fish species, are certainly well exploited by a small proportion of the islands' gulls, but as with other man-assisted food sources quantities do not match those to be found in many other parts of Britain. In 1974 the situation offshore was complicated by the presence in Cornish and Scillonian waters of unprecedented numbers of Russian and other Warsaw Pact countries' trawlers and 'factory ships'. Being both larger and better equipped than the traditional British trawler, these are capable of catching much greater numbers of fish, and it would be reasonable to suppose that the amount of non-usable waste available to scavenging gulls is

IN PROPOSED CONTROL AREAS ON ANNET.

DOUBLE LINE MARKS LIMIT OF PROPOSED CONTROL AREA.

X INDICATES APPROXIMATE LOCATION OF INDIVIDUAL PAIRS OF GREAT BLACK-BACKED GULLS NESTING IN THE PROPOSED CONTROL AREA IN 1974.



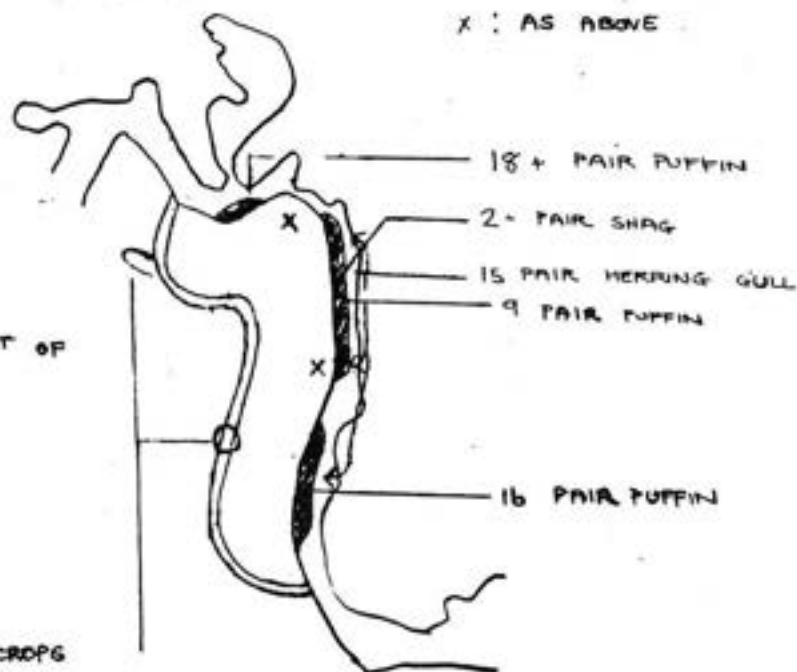
MAP 18

ANNET HEAD

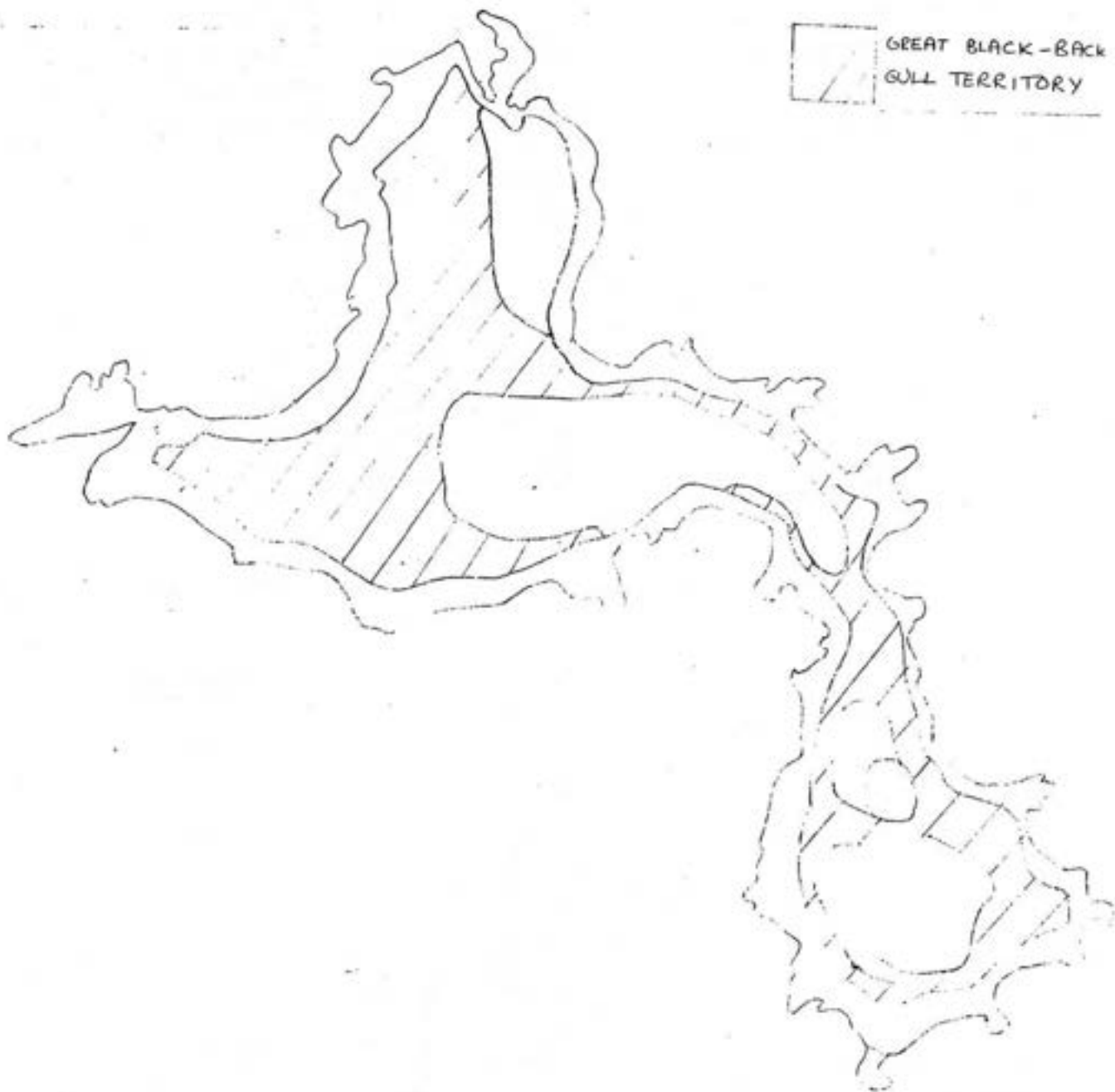
X : AS ABOVE

DOUBLE LINE MARKS LIMIT OF PROPOSED CONTROL AREA

PROMINENT ROCK OUTCROPS



MAP 18A



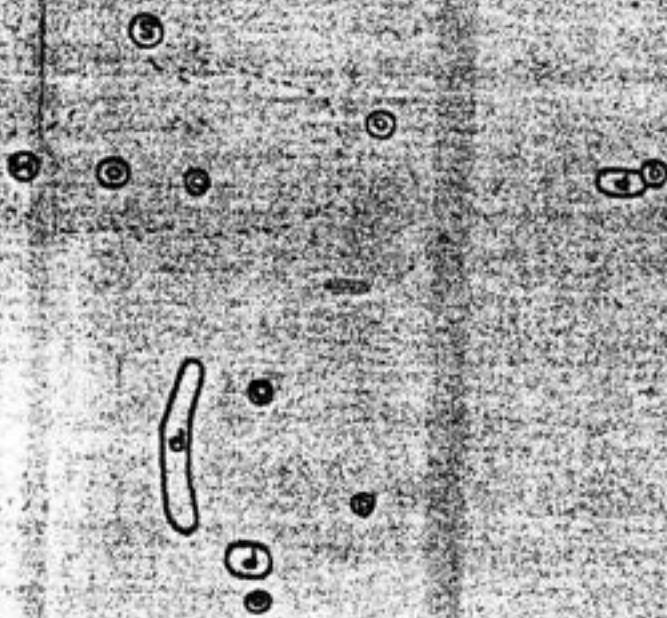
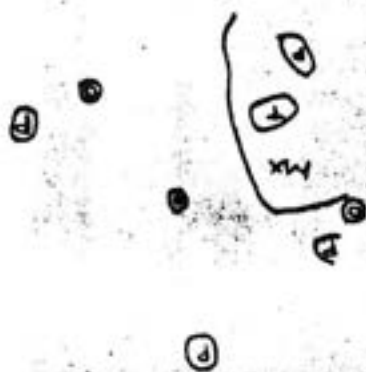
MAP 17

MALPARD, OYSTERCATCHER, COMMON TERN AND PUFFIN IN

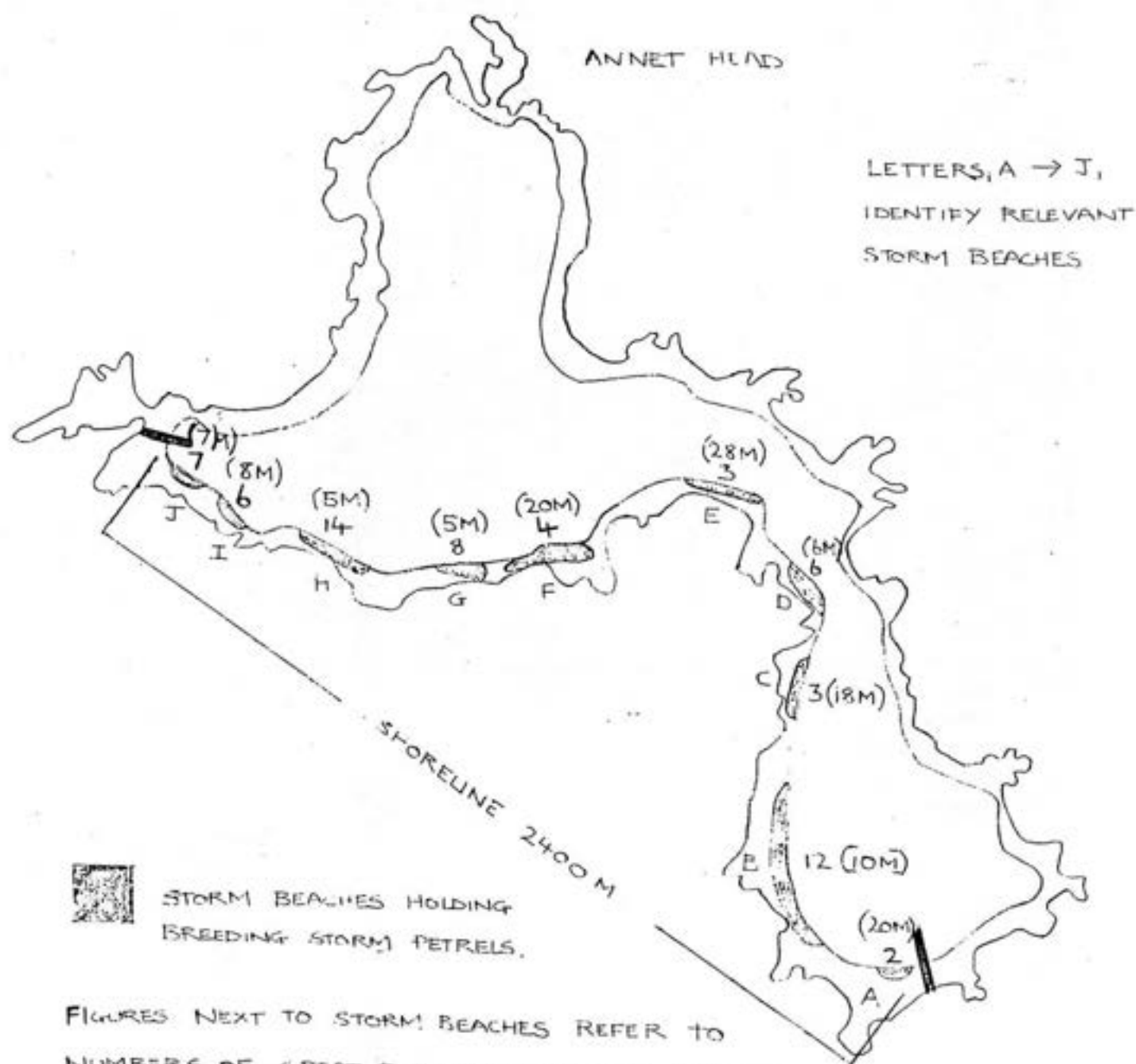
RELATION TO GREAT BLACK-BACKED GULLS 1974. -

MX: MAINE SHELLFISHER (NOT COMPREHENSIVE)

S: SHELLFISH
M: MALPARD
O: OYSTERCATCHER
T: COMMON TERN
P: PUFFIN



DENSITY RATE OF BREEDING GREAT BLACK BACKED GULLS ALONG
STORM PETREL NESTING HABITAT ON SOUTH SIDE OF ANNET 1974:-



FIGURES NEXT TO STORM BEACHES REFER TO
NUMBERS OF GREAT BLACKBACKED GULLS NESTING
ALONGSIDE EACH BEACH.

FIGURES IN BRACKETS NEXT TO THE ABOVE GIVE THE AVERAGE DISTANCE
IN METRES BETWEEN THE NESTS OF THE 10 GROUPS OF GREAT
BLACKBACKS INVOLVED.

THE AVERAGE DISTANCE OF ALL NESTS ALONG THE SURVEYED AREA
WAS 275 METRES

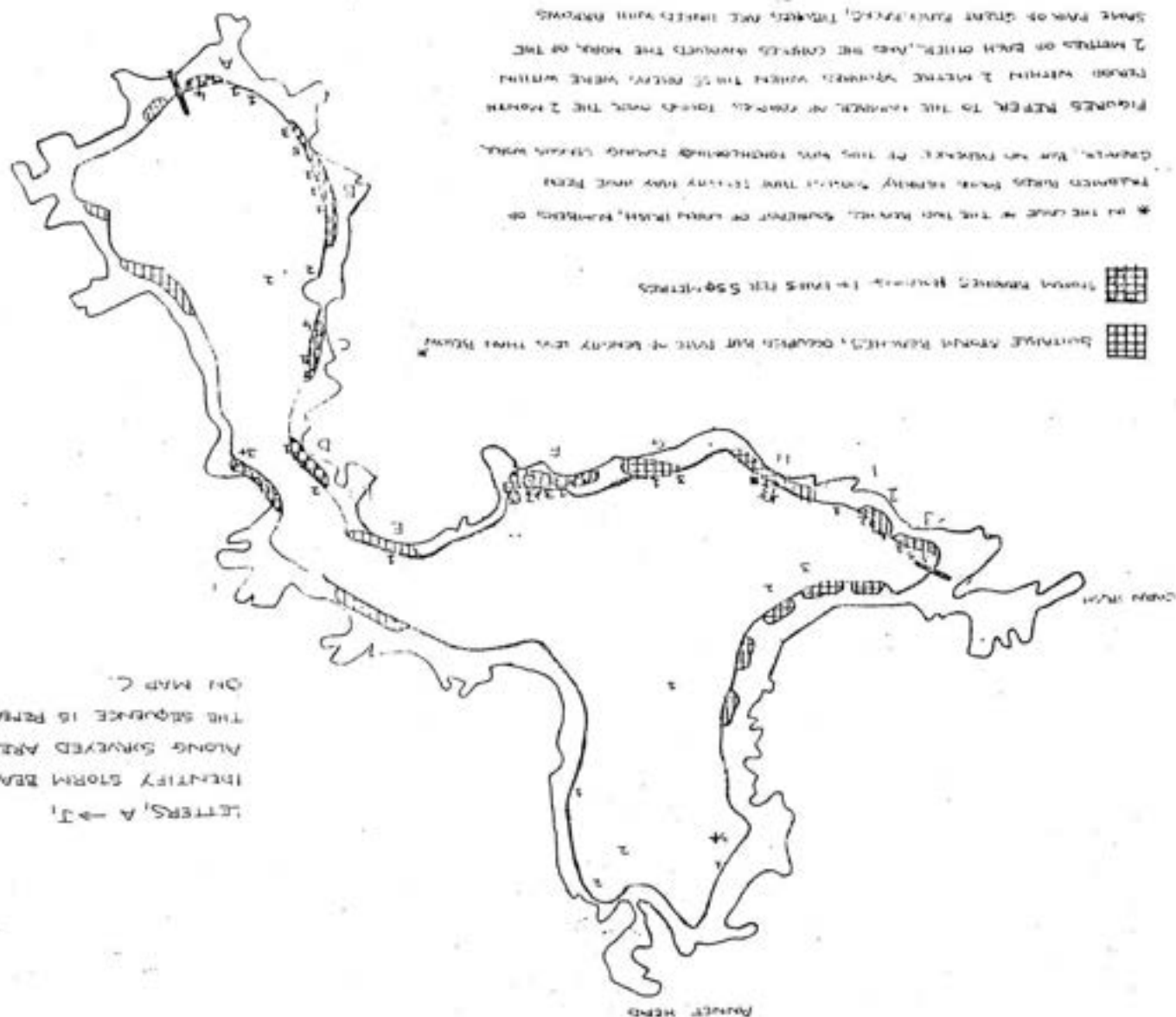
MAP 1.6 A

MAP 16

* At the end of the two hours, southeast of each beach, numbers of
 fallen birds were rapidly counted. These birds have not been
 counted, but an estimate of this was forthcoming during certain work.
 figures refer to the number of birds found along the 2-hour
 period within 2 miles of the beach, which the 2 miles were within
 2 miles of each other. The birds were counted the day of the
 same pair of birds found, taken, and birds were shown.

Storm damaged houses: 1-1000 ft 500 ft

Storm damaged houses: 1-1000 ft 500 ft



ON MAP C.

LETTERS, A → J,
 IDENTIFY STORM BEACH
 ALONG SURVEYED AREA
 THE SEQUENCE IS PERMANENT

1974

MAY - AUGUST

ANNET HEAD



MAP 15

Narcotic baits have a distinct advantage over direct poisons in that non-pest species ingesting them have the chance to recover, where as strychnine nitrate is non-selective and could cause havoc if eaten by non-gull species. Accidental consumption by other birds could be largely avoided on Annet by selecting baits such as rabbit or beef dripping that would be unattractive to all but Great Blackbacked and Herring Gulls; the location of the bait within the nesting territory reduces the likelihood of other species taking the carrion.

Shooting has the great advantage of being simple and clear cut, with few if any possible adverse consequences or side effects. Breeding Great Blackbacks standing their territories make large and usually motionless targets. A.22 would be preferable to a shotgun, as the report is quieter and would cause less disturbance to other birds. Two objections must, however, be raised. Firstly, noise and/or disturbance cannot be eradicated entirely, and its deleterious effects must be considered, especially to the Puffins around whose nesting sites control measures will probably take place at a sensitive time in the breeding cycle. Secondly, given the history of indiscriminate shooting in the Scillies, even the well justified use of guns by the Nature Conservancy may be inadvisable in terms of public relations: the shooting will inevitably be noticed, and might be interpreted as carte blanche for illegal destruction of gulls at other sites.

To my mind, the unlikely but still possible side effects of narcotized bait must be weighed against the disturbance from shooting, a complicated and necessarily lengthy procedure against a simple but conspicuous one. Having considered the slender chances of inadvertant consumption by other species, I advise the use of narcotized bait as the more controlled means of reducing Great Blackbacked Gull numbers in the two small areas proposed.

on Annet is rather different, as predation is casual and specialisation at most limited: the task is not to dispose of particular aberrant individuals but to clear areas where the cumulative effect of the Great Blackback populations seems to be detrimental. The identities of the birds involved are therefore easily discernable from their location, and no problems should arise. It might be argued that individuals or pairs doing notable damage in 1974 may not necessarily return to the same breeding territory next year, but as physical proximity rather than active searching is the dominant form taken by predation, the objection is not really valid. In addition, all the evidence from this and other colonies points to consistent loyalty over many years to next sites, and a quick check on 1975 on the continued presence of ringed adults 50 metres south of Carn Windlass, two along the shoreline on the south side approaching Carn Irish and a singleton nesting by the long bay north east from there will most probably bear this out.

The removal of Great Blackbacks from the two critical areas must be as comprehensive as possible: Maps 18 and 18A should help. For obvious reasons accurate control measures are effective control measures; correct identification and elimination of the birds that nest on the cliff top between North East Porth and Annet Head is especially important in this respect.

TECHNIQUES

Management methods may be divided into 2 forms, the limiting of adults and of immatures, and control via eggs and young. As implied in the paragraphs above, the second category is not relevant to the situation on Annet. In 1974 the presence or absence of young had no discernable effect on the frequency of predation: on 18th June, for instance, the one surviving chick of a Great Blackback pair was killed following the discovery of Tern remains by the nest, but during the next 7 weeks the parent birds accounted for 2 Storm Petrels and a Manx Shearwater. While removing or sterilising eggs is a good method of reducing breeding success in given areas, the birds will continue to remain on their territories, and so the main objective would not be achieved.

Control measures must therefore concern limiting the numbers of adult birds. Two non-fatal methods have been used at various times, either scaring the birds away with noise machines, scare crows or amplified recordings of their distress calls, or by modifying the gulls' breeding habitat. Both would involve considerable regular disturbance to other species breeding nearby, and must be ruled out because of the localised areas involved.

So management policy must focus on eliminating the birds: 6 techniques have been described in the relevant literature: rocket or cannon netting; trapping; catching by night; poisoning; narcotizing; and shooting. Of these, the first is impractical because of the interference to other birds this would involve; the second and third might prove useful supplementary methods, but would be very time-consuming if all the birds had to be caught this way. The choice is therefore between poisoning with toxic or narcotic bait and shooting.

Poisoning involves placing treated bait by a gull's nest or within its territory; this is then consumed by the resident bird, with appropriate results. Success is often good, on Copeland Island, for example, 73% of narcotized baits placed at a Herring Gull colony were taken, and the method is obviously well suited to selective elimination.

CONTROL MEASURESINTRODUCTION

The reasons for limited control measures against Great Blackbacked Gulls have been presented in the review of gull damage on the preceding pages. If the measures recommended are considered an acceptable and necessary part of conservation in Scilly, it is important that the work is done in the best way possible. There are a number of different approaches to gull management, and wise decisions are usually the product of considerable experience of the problems involved. Despite my own limited knowledge of techniques and related difficulties, I've tried to outline some of the alternative choices below, giving my own suggestions at the same time.

TIMING

The best time for administering control measures would in theory be during the first weeks of May, when the gulls have established their breeding territories and the first eggs are being laid; if their breeding rhythm in 1975 is earlier than in 1974, as is quite likely, then suitable dates should be arranged accordingly. Although Great Blackbacks seem to do little damage at the start of the breeding season, it is important that measures are taken as early as is practical, so as to avoid disturbance to other species nearby.

In dealing with the gulls nesting along the shoreline south from Carn Windlass, as shown on Map 18, elimination must take place before the terns have begun to take up territory again, or else the measures may well prove counter-productive. Observations on tern behaviour in Scilly indicate that on returning birds will spend the first two weeks or so prospecting widely around the islands before settling down to lay, on average, during the middle days of May. Ideally the optimum period for ridding the area of pressures from gulls would be before the terns arrive in the last 10 days of April, so that the nesting habitat would appear immediately attractive. This might well be before the gulls have assumed territorial positions, however, but action should not be delayed until the middle of the next month.

The timing of gull management above the cliffs at North East Porth is more complex. Puffins return from their wintering grounds out at sea in the middle of March, and the first two weeks or so around the nesting area are spent prospecting and renovating old burrows: courtship and territorial displays follow this, and egg laying usually occurs in late April. During these preliminaries to the breeding season Puffins are sensitive to disturbance at nesting sites, especially while returning to land for the first time. Although in general periodic human presence probably has little effect on their breeding cycle or success, it would be preferable if control measures against the gulls are administered after the majority of Puffin pairs have commenced incubation duties. This may well be hard to assess, though it is reasonable to assume that the first week of May would be suitable. In my opinion the use of guns here would cause excessive disturbance to the Puffins: evidence in support of narcotizing techniques is given on the following page.

IDENTIFICATION

At many sites in Britain where gull numbers have had adverse influences on the breeding performances of other species, a major feature of gull management has been eliminating demonstrable 'rogue' gulls. The situation

the situation with regard to the first species has altered over the last 30 years, probably because Shearwaters have declined and no longer constitute an economic food supply, while damage to Cormorants might in certain circumstances be great.

Predation of Common Terns and Puffins was altogether more serious, especially as these two birds are perhaps the most prized of Scilly's seabirds. Value judgements on the relative merits of birds must never be allowed to prejudice objective assessments, but it is, I think, irrefutable that the probable extinction of the ternery on Annet and a 25% reduction in potential breeding success of Puffins on Rosevear are matters for concern.

In terms of predation as a source of food the vast majority of prey involved Lesser Blackbacked, Great Blackbacked and Herring Gulls, in descending order of quantities taken. All three are of course highly successful and increasing species, and the role of predation as a natural check on future population rises is particularly interesting.

Of non-seabird species, duck, and in particular Shelduck, were prey for Great Blackbacked Gulls: indeed, damage to the last species was, in terms of population, the heaviest on all birds in Scilly. Oystercatchers suffer considerable interference and some predation. Attacks on other species were rare and damage almost non-existent.

RESULTS OF 1976 SURVEY (Observations on Predation)

On the 18th and 19th July, Bailey visited Annet in order to count pellets from Great Black-backed Gulls. Of these 28 contained Storm Petrel remains, 3 Manx Shearwater, 4 small passerines, most likely Rock Pipit or Wren. Seven Manx Shearwater corpses were found in varying stages of decay on the southern end of the Island.

The ratio of Storm Petrel to Manx Shearwater remains is broadly similar to 1974. This suggests that the pattern of predation by Great Black-backed Gulls recorded in 1974 is generally typical of other years.

from the various nuisances the birds commit. While many people accept their presence as an integral part of island life, others feel justifiably annoyed at some aspects of their behaviour.

Perhaps the most widespread cause of complaint is that gulls persistently defecate on boats in the harbours, leaving permanent marks on the paintwork and varnish. On St Mary's and Tresco alighting gulls are shooed away as often as possible, but such measures obviously can do little in the way of protecting property. Allied to this are the messes made by loafing birds to the rooves of houses around the harbours; hotel and guest house owners feel especially irritated by the unsightly results.

These nuisances are largely confined to St Mary's and Tresco, islands where the impact of tourism has most affected the general style of life. The presence of loafing gulls away from breeding sites is directly related to the quantities of exploitable refuse available. In the past, when island people were by necessity more self-sufficient and conspicuous waste limited, few gulls frequented the harbours and towns as the rewards to be had were small. On St Martins, Bryher and St Agnes gulls are still notably absent today: at Old Grimsby, in contrast, flocks of up to 150 Herring Gulls have become regular in recent years, their arrival coinciding with the conversion of the houses into holiday cottages for tourists.

On the off islands gulls are actively discouraged from hanging around human habitation. Much of the islanders' water supply comes from rain water tanks on the rooves, and any gulls landing on the houses are promptly shot: a prudent measure in the light of the evidence of pollution to water supplies and consequent health hazards from gulls. More specific annoyance comes when animal or avian husbandry by islanders receives the attention of gulls. On Tresco, for example, gulls do damage to the poults of introduced Pheasants and North American Bob White Quail, hunting out the young both around the gamekeepers' pens and over open arable land. Snared rabbits are also taken on occasions, which understandably infuriates local people. Shooting and its associated game are a central feature of no other island in Scilly, and equivalent nuisances do not occur on St Mary's. Hostilities to gulls here away from the harbours and seashore usually concerns fears for the safety of domestic hens or ducks. Although gulls, and Great Blackbacks in particular, would not in 'natural' circumstances hesitate to attack such valuable foot items, most chicken and duckling runs are situated close to houses, and this acts as an effective deterrent to marauding birds. In exceptional cases, however, gulls have been shot by property owners weary of the constant attentions of individual birds.

In poor weather and during ploughing times gulls, especially Herring Gulls, settle on the fields and pastures inland to rest or feed. Few farmers are annoyed by this habit, and some even welcome the birds' presence as an attractive addition to the normal scene. On the other hand, gulls behaving thus sometimes suffer the indignity of being bombarded by sods of earth from disgruntled seasonal farm workers!

SUMMARY

During 1974 predation by Great Blackbacked Gulls on other birds was found to be in most cases rare and its effects generally insignificant. No attacks on Fulmars, Kittiwakes, Razorbills or Guillemots were recorded, and damage to Manx Shearwaters, Storm Petrels, Shags and Cormorants was considered mostly inconsequential: on present evidence

birds. A more effective way of protecting the Terns would be to close the footpath between the ternery and the beach, as stressed before: problems of liaison with the leasees of the island are outside the scope of this survey.

Attacks on young Terns involved Herring Gulls and not the Great Blackbacks that congregate in much larger numbers around, Tresco, an interesting exception to the general pattern of predation noted in 1974. The birds responsible were almost certainly non-breeders, and the resulting damage parallels similar predation by gulls not constricted to breeding duties noted at other sites in Britain.

PUFFIN

Gull damage to Puffins is discussed in some detail on page 48-50. Although predation might be considered minimal and specialisation by Great Blackbacks not proven, Puffins are such a valued feature of wildlife in Scilly that mortality from this cause must if possible be averted. On Annet control measures should be implemented in 1975 against Great Blackbacks nesting within 25 metres of the favoured cliffs between Annet Head and North East Porth: the area and further details are shown on Map 18A. As noted under the preceding species, selective elimination of Great Blackbacks at the southern half of the island will counter possible threats to the smaller numbers of Puffins there.

Damage on Rosevear was more serious in that just one predated Puffin represented a 25% loss in potential breeding success at this site. Access to Rosevear is often difficult, dependent on the vagaries of tide and weather, and to my mind not enough is known about the habits of the individual Great Blackbacks on the island for control measures to be feasible. Whereas accurate identification of rogue or potential rogue gulls on Annet will present few problems - see page 77 - nesting density on Rosevear will probably make responsible elimination impossible.

SWALLOW

The tail feathers of an adult Swallow were found beside an occupied nest of a Great Blackbacked Gull on St Helens in early June. The victim must have been grounded and was presumably an ailing migrant, as Swallows would normally present insuperable difficulties to any Great Blackback keen to vary its diet.

PASSERINES

There was no evidence that in 1974 Great Blackbacks took any passerine species, although such behaviour has been noted elsewhere in Britain. On Annet, the 26 pairs of Rock Pipits enjoyed an exceptional breeding seasons, despite widespread nesting within Great Blackbacks' territories: from mid June onwards young were everywhere on the island.

However, in conditions of severe food shortages or exceptional bird movements passerines are undoubtedly preyed upon. In January 1963, when arctic weather over the mainland initiated huge dispersals of wintering birds to the West, gulls at Daymark Head St Martins were watched for many days taking exhausted Redwings and other thrushes.

NUISANCES BY GULLS TO ISLANDERS

The ambivalent attitude of the residents of Scilly to gulls also stems

A visit to Annet in late August showed that mortality among fully developed immatures largely independent of their parents also occurred: some 5 corpses were found along the southern shore. A local fisherman reported that in mid August an adult Great Blackback had intentionally drowned a bird of the year while scavenging for offal around his boat: direct competition for food between young and adults may sometimes lead to the death of the less experienced bird, and this is one of the dangers that young must survive to enjoy the security from all but human threats in subsequent years.

In mid and late July young were more conspicuously noticeable on Rosevear than Annet, despite the greater cover for skulking birds here. In past years success on the island was thought to be usually low as breeding density was so great; in 1974, however, it seemed that rather more Great Blackbacks reared young than previously. Landings on Rosevear showed that young kept well hidden in the mallows and storm beaches, and the varied terrain may have afforded effective protection against predatory individuals.

COMMON TERN

Predation by Great Blackbacked Gulls of 1 adult Common Tern and one egg was seen on Annet, and Herring Gulls disposed of at least 4 Tern chicks on Tresco. Continual observations were obviously not possible at these or other colonies, and as stated previously it is very likely that eggs and young were preyed upon more frequently than the above evidence suggests.

This applies especially to the colony on Annet, where pressures were exacerbated by often inadvertent harassment by passing gulls. The island has for most of recorded ornithological history been a stronghold for terns in Scilly. Despite an increasing gull population and a serious fire in 1951, they nested annually in sizeable numbers, usually over 40 pairs, until the mid-sixties. In some years Roseate, and exceptionally Arctic Terns bred too. In the last 8 or so years the population has dwindled: 8 pairs were present in 1957, and 7 in 1974. The decline has coincided with the spread of Great Blackbacks on to the margins of the main Tern breeding area south of Carn Windlass, and at the present time the continued presence of Common Terns on Annet is clearly threatened by the dominance of the Great Blackbacks.

As mentioned before, both known cases of predation in 1974 involved the nearest pair of Great Blackbacks to the ternery, and it would seem that physical proximity increases the likelihood of predation. To safeguard the future status of the Common Tern as a breeding bird on Annet, I recommend that all Great Blackbacks taking up territory along the shore from Carn Windlass to the southernmost tip of the island are eliminated in April 1975. Not only would their absence benefit the terns: possible threats to the Puffins breeding in the adjoining storm beach would be removed, and pressure on the important concentration of Storm Petrels relieved. The approximate locations of the Great Blackback pairs in relation to the above seabirds are given on Map 18; methods of gull management are discussed on page 76-78.

Predation on young Terns at Tresco was an inevitable consequence of human disturbance, coupled with large gatherings of gulls nearby. Selective elimination of demonstrable rogue Herring Gulls must be rejected as impractical because of the difficulties in identifying the individuals, but it should be remembered that gull management by the gamekeepers of the Tresco Estate may go some way to deter predatory

'converting' the corpse into food, make larger young a less convenient food supply.

In general, predation of eggs was less intense than of chicks. As mentioned on page 25, the average clutch size around Carn Irish was high enough to suggest that egg loss was minimal, and none were taken from 8 marked nests at this site during the last 10 days of incubation. Taking the island as a whole, however, clutch sizes were consistently smaller on the Eastern side of Annet, where up to 20% of nests contained only single eggs at peak hatching time.

Differences in breeding experience may go some way to explain this variation, as Carn Irish has always been the most populated and stable area for Great Blackbacks, while the southern half of the island has been colonised comparatively recently. However, the numbers of fledged young were also highest around Carn Irish, and very low east and south of the neck, so nesting density in 1974 may have conditioned breeding success. On the thrift areas towards Carn Irish and Annet Head most young were killed once they had strayed from territories; smaller numbers were picked directly from the vicinity of nests. In general all predation was casual and opportunistic, and there was little evidence from observations and casts that individual pairs specialised in others' young reasons; for this clearly result from the considerable power of the Great Blackback to defend its young, and their social but not colonial nesting habits. The overall picture suggests that successful predation would be rather easier when territories are extensive and the parent birds perhaps less vigilant, because of the absence of other pairs immediately close by.

Predation was considered to be the main reason for the poor success rate on Annet. Although the 50 to 100 young fledged would probably be sufficient to maintain numbers in future years, intraspecific damage constitutes a powerful natural check on the rate of increase. Population trends in the next few years on Annet will be interesting: breeding density and predation patterns may well all change, with significant effects on the numbers of young reaching the flying stage.

In addition to chicks taken for food, there were numerous incidents in 1974 of Great Blackback killing young in seemingly arbitrary manner. Some mortality was undoubtedly the result of poor parental management - chicks were found with punctured windpipes and torn wings, more likely the work of parents than thwarted predators as young were still in their nests - but others were slain for more perplexing reasons. On Great Arthur in early July a well developed pre flight immature swimming off shore was attacked with considerable aggression by an adult nearby, which may well have been the young bird's parent; on Annet parent gulls often attacked their young if the latter were trying to regain the nesting territory following disturbance. It is well known that adult gulls cease to recognise their own progeny outside the identification structure of the territory and will kill such lost youngsters, but in the above cases the attacks, while dangerous to the young, seemed calculated not to kill, though twice they incapacitated the victims which were taken by other adults. There was no doubt the marauding Great Blackbacks were aware that the potential victims were their offspring, and one interpretation is that the behaviour amounts to a kind of survival test for young, giving them experience of the aggressive universe inhabited by the Great Blackback.

Adequate protection of young from intraspecific predation may have involved more experienced breeders, especially on Samson; where numbers on consused beaches have increased since 1974 and breeding success was comparatively good. On this island rising numbers also breed amongst the Lesser Blackbacks, and these birds too were generally successful, benefitting perhaps from having fastidious Lesser Blackbacks rather than acquisitive Herring Gulls as their neighbours.

On Annet the very low number of chicks reared was also due to considerable predation by Great Blackbacks. In late May and early June regular raids on the colony at Carn Windlass were made by individual Great Blackbacks nesting nearby, young being snatched up from the rock boulders and swallowed in the predators' nesting territories. Analysis of breeding success in relation to habitat selection on Annet showed that young were more vulnerable to attacks on open or level ground than at cliff sites. While no chicks were raised at the main Herring Gull concentration of 44 pairs along a pebble beach at the southern tip of Annet, 15 pairs nesting at the base of the cliffs along North East Porth brought off 5 young, the highest success rate on the island. The advantages of nesting in 'corner sites' among the talus below cliff faces would seem related to the difficulties of access for marauding Great Blackbacks, though other factors probably play a part - see pages 22-23. Herring Gulls have chosen similar sites on Annet in increasing numbers since competition for beach sites with Great Blackbacks started in the early 1960s around the southern half of the island. Although suitable talus areas are limited, it is likely that in the future, nesting density around cliffs will be greater.

As with other *Larus* chicks, mortality from direct predation did not occur once young were over three weeks old and had gained a degree of self sufficiency in behaviour if not food.

GREAT BLACKBACKED GULL

Lesser Blackbacked Gulls were seen twice to take eggs of Great Blackbacks on Annet. These were exceptional incidents, and to 'fanciful' human eyes seemed motivated by revenge against the very heavy traffic in predation the other way.

All other predation was intraspecific. Most observations were on Annet, but the details on breeding success given on page 26 indicate that the situation here was not abnormal. The scale of predation was hard to quantify as visits were necessarily intermittent and so the life histories and fates of individual nests were impossible to follow. However, patterns of predation clearly emerged.

Firstly, eggs and chicks were taken throughout the breeding season until the young were too big to be swallowed easily: on Annet, most had reached this stage by the beginning of July, when all corpses showed non-intraspecific causes of death. The problems presented by well developed victims to their consumers were well illustrated on 25th June: a Great Blackback was watched from 1530 hours to 1800 hours trying every means it could devise to consume an approximately three week old chick, attempting in vain to swallow the bird whole, then beating it on the rocks into a malleable unit, failing, then ripping off its wings and feathers, all punctuated by uncomfortably gross efforts to juggle the prey down the throat; the process continued long after the observers' patience, but not the gull's ingenuity, was exhausted. During this time the Great Blackback was watched closely by others nearby, and its right to the meal occasionally challenged. It would seem that the size of the prey, combined with the chance of being robbed while

with almost arrogant ease. By late June the Lesser Blackbacked Gulls would react nervously to any possibly predatory gull around their colonies, and they did not bother to see off these birds with much vigour, suggesting that defences to what had become an established pattern of interaction in the breeding season were no longer economical. An interesting observation on 23rd June concerned a preflight juvenile Great Blackbacked Gull that had wandered by accident into the Lesser Blackback colony west of the neck: instead of driving away the impotent trespasser, the resident birds stayed close to their nests and took evasive action when the confused juvenile passed by.

As with intraspecific predation, the influence of bad weather and poor visibility on the rate of attacks by Great Blackbacks was notable. Appallingly unseasonal weather on 12 dates immediately following the peak hatching period for Lesser Blackbacks between 25-30 June was undoubtedly a major cause of the lack of breeding success on Annet. In some ways the role of poor weather in stimulating predation by Great Blackbacks is less clear than with their smaller relatives. In Scilly the species feeds mostly in inshore waters, where the shoals of surfacing fish would be less susceptible to wind and rain than those in more pelagic waters; location of food in bad weather would, I think, present fewer difficulties to Great than Lesser Blackbacked Gulls. It seems, therefore, that the importance of poor visibility and the like to successful predation lies in the greater number of birds, and consequently greater confusion, in the colonies, circumstances that Great Blackbacks are well able to exploit.

HERRING GULL

Predation on Herring Gulls was broadly similar to the situation with Lesser Blackbacked Gulls, in that damage came from Great Blackbacks and their own species. No incidents of Lesser Blackbacks preying on Herring Gulls, or the contrary, were recorded, though these may have occurred at mixed nesting sites.

Assessment of predation on Herring Gulls on Annet was hampered by the difficulty of observing the numerous small colonies without disturbing the birds and thus initiating atypical pattern of behaviour. In general there seemed to be little egg stealing, for clutch sizes at all colonies visited in late May were between 2.5 and 3, significantly higher than those of the other 2 *Larus* gulls at the equivalent stages of breeding progress: no taking of eggs were seen, and very, very few smashed shells found. Reasons for this probably stem from the well synchronised breeding cycles of the Herring Gulls in Scilly. While the periods between first and last hatching dates for Lesser and Greater Blackbacks were 25 and 50 days respectively, all Herring Gull eggs on Annet and Samson hatched between 27th May and 15th June. Research has shown that close correlation of breeding progress amongst the bulk of social populations leads to improved success rates.

Cannibalism of young by adult Herring Gulls on Annet was noted on a few occasions, but most probably occurred with some frequency. Such behaviour has been seen here in many previous breeding seasons, and on both Annet and Samson a high proportion of successfully fledged young involved broods of two, suggesting that parental management was an important condition for breeding success: on Annet, for example, of 4 reared from 33 breeding pairs at Carn Windlass, 2 were from the same nest: on three beaches on Samson the proportion of pairs raising 2 young to all successful pairs were 33%, 15% and 50%, while on the Gugh 18% of all successful pairs reared 2 chicks to the flying stage.

morning when wind and rain was fresh from the Southeast. The same pattern persisted later in the month: predation was at least three times as frequent when rain or mist obscured visibility than when the weather was normal. Two explanations may account for this phenomenon. Firstly, poor visibility, especially less than five kilometres, undoubtedly inhibited departures to feeding grounds at dawn, and forced birds to return from offshore waters earlier in the afternoons and evenings. Predation in such conditions may therefore compensate for time and food lost earlier in the day. A second, and perhaps more important reason concerns the greater number of birds in the colonies during inclement weather. While opportunities for predation were normally limited by the incubation duties of the birds present, a surplus of 'off-duty' breeders would lead to more squabbles over territories, and so nests left unguarded more often.

Predation by Great Blackbacks on eggs and young, as noted before, was intense on Annet, and was a commonplace feature of all visits to the island until mid July, by which time few, if any, young remained to be taken. Given the relative numbers of species breeding on Annet in 1974, it was clear that Lesser Blackbacks were considered by their larger, predatory relatives to be the most readily available avian source of food. In contrast to the patterns of predation on most other species, many Great Blackbacks obviously specialised in raiding the two gulleries: not only did they make the usual sporadic forays for unattended eggs or young, but also intimidated incubating Lesser Blackbacks off their nests by hovering over them, occasionally stooping down in the manner of a clumsy raptor. In late May and early June visits by these specialist birds to the large colony at the south of the place took place throughout each day, and were especially frequent during the last 4 to 5 hours of daylight. Unlike predation on other species, proximity to the food source did not seem to be an important conditioning factor, in the sense that most of the ten or so regular predators on the southern Lesser Blackback colony nested more than 100 metres away, towards the neck of the island. However, it was noticeable that Great Blackbacks nesting on the periphery of the colony tended to limit disturbance to their neighbours, presumably because regular attacks would have invited perpetual mobbing and chivvying from the Lesser Blackbacks. Supporting evidence for the inverted influence of proximity to prey was that the very few pairs of Great Blackbacks that nested amongst Lesser Blackbacks on Annet all deserted by mid June, suggesting that the effects of adverse interference thwarted their breeding drive.

Predation by Great Blackbacks was slightly reduced from mid June onwards, presumably because parental commitments to their own young to a large extent precluded such time-consuming methods of gaining food. But a notable development at this time was the arrival of non-breeding or failed Great Blackbacks that took up territories on the fringes of the Lesser Blackback colonies. These were most probably local birds, from other parts of the island, clearly adapting to a plentiful food supply and perhaps also to the diminishing competition for eggs and chicks. Observations showed that by this time Lesser Blackbacks were seldom successful in defending their progeny against concerted aggression by Great Blackbacks. Despite the Lesser Blackbacks' bold behaviour towards human intruders and the great security they enjoy from social nesting in large numbers, in the majority of cases predatory Great Blackbacks reacted with little more than mild annoyance to the Lesser Blackbacks' defensive tactics. The larger birds' quick reactions and surprisingly tight manoeuvring often rendered mobbing ineffectual, and on some occasions preying Lesser Blackbacks safely in possession of their taking would suddenly be robbed by passing Great Blackbacks

Gull nest containing 2 cold eggs, and on 6 visits in late June and July only a single chick was seen. It is possible that in addition to direct predation from gulls, Oystercatchers also suffered from the prevalent atmosphere of predation on Annet. Although they are often conspicuously self-confident birds, their highly strung temperaments make them react to outrageous behaviour nearby with explosive indignation. One pair near Carn Windlass responded to daily predation by 2 Great Blackbacks on Herring Gull chicks by scolding and mobbing the offenders for up to 20 minutes, neglecting their eggs in the process. Inhibited breeding behaviour may have resulted with some pairs: at Carn Irish a pair inexplicably abandoned their nest in mid June when the eggs were actually hatching.

In contrast to Annet, breeding success on Tresco and other 'gull-less' islands was high, with many young in evidence from July onwards. Persistent disturbance from people would seem to be less damaging than pressure from gulls.

RINGED PLOVER

No cases of interference from gulls on Ringed Plovers were recorded in 1974, but it is interesting that despite obvious difficulties over 60% of the Scillies' population breed on the inhabited islands. Numbers on apparently suitable beaches on Tean, St Helens and elsewhere were low, and gulls may well influence the species' distribution. Until about 1970 a pair traditionally nested on the sand spit on the southern shore of Annet. Although the beach has contracted in recent years, increased pressure from Great Blackbacks in particular may have contributed to the birds' absence in recent years.

TURNSTONE

The predated corpse of a Turnstone in transitional plumage was found on Rosevear on 18th June. Exceptional, but considering the attraction of the island to disorientated and often tired migrant, and the high density of breeding Great Blackbacked Gulls, perhaps not altogether surprising.

LESSER BLACKBACKED GULL

As stated on page 17 predation on Lesser Blackbacks occurred in two forms, intraspecific predation by Lesser Blackbacks, and by Great Blackbacks.

Intraspecific predation took place fairly frequently on Annet and Samson, and probably at all other sizeable colonies: it is a normal feature of gull behaviour during the breeding season. Damage seemed exclusively confined to egg-stealing. Predation on young was not observed, and no chicks were found in many hundreds of casts from late June onwards. Lesser Blackbacks may be reluctant to take their own chicks because their diet does not include either carrion or man-assisted meat refuse. Whereas Herring and Great Blackbacked Gulls consumed fish foods as well as their own and other young, Lesser Blackbacks ignored apparently suitable corpses: 15+ remains of young chicks, none showing signs of predatory attacks, lay untouched on 1st July at the centre of the colony on Samson.

During stays on Annet, it was very marked how the rate of predation increased when weather, and especially visibility was poor: for example, during three days of census work on the two colonies in early June, birds exploited the intrusions and took eggs on only one

three quarters of Mallard broods are lost in this way, and prior to the introduction of covered pens hard-reared pulli were also taken at will.

Not surprisingly, control measures have been administered many times against gulls showing particular interest in the Great Pool and its contents. In 1974 30 to 40 birds were shot between early March and late April. The move was considered a success, as the duck enjoyed an exceptional summer: over 60 young were fledged. The marauding individuals clearly came from the motley collection of sub-adult and non-breeding gulls that hang around the southern beaches of Tresco. The history of these birds suggests that in 1974 regular predation was confined to a limited number of birds; specialisation has been suspected in previous years. While some doubts must be expressed about how well disciplined the control measures are - this year disproportionate numbers of Lesser Blackbacks were killed, mistaken, I'm sure, for their larger relatives - the measures are of course a justifiable and probably essential part of the gamekeepers' job.

On Annet, a pair of Mallard nested among long grass in the centre of the island. Incubation was noted on 26th April and 18th May, but there were no signs of eggs, chicks or adults in late May. Predation, followed by desertion, must be considered a likely explanation at this largely undisturbed site.

Small numbers of Teal, Gadwall and Moorhen young have been taken by gulls on Tresco Great Pool in past years; apparently Coot, which breed there in some strength, are largely ignored. In 1974 2 broods of Teal were raised successfully on St Mary's. 4 young were fledged on the Lower Moors, certainly benefitting from the absence of resident gulls in the area, at Porth Hellick 6 young to the flying stage was the first successful breeding record for some years, presumably because visiting gulls were less in evidence than in previous summers.

OYSTERCATCHER

Oystercatchers are widespread in Scilly, breeding on rocky stacks like Scilly Rock and Mincarlo as well as in more varied habitat on Gweal and Samson and the less populated inhabited islands. Few accurate counts of the population have been made, but in 1974 9 to 11 pairs nested on _____. Numbers have declined since the 1960s, when 18 to 20 pairs bred annually: a similar drop has been noted on St Agnes, but on this island increased pressure from tourists provides the readiest explanation.

The situation on Annet is, I think, directly related to increased interference from the expanding Great Blackbacked Gull population. Map 17 shows the relative distribution of the 2 species: 2 of the 11 pairs of Oystercatchers nested in densely populated sections of Great Blackback gulleries; 4 pairs around the fringes; and 5 pairs chose sites in Lesser Blackbacked colonies. Nest site selection was catholic, ranging from rocky outcrops with minimal vegetation to bracken and thrift areas, and so it seems that predation from predators rather than habitat was the determining factors.

Studies on ducks and waders nesting amongst concentrations of gulls and Terns have shown that breeding success is often high because they benefit from additional protection by the neighbours against external threats like rats and foxes. This was clearly not the case on Annet in 1974, as the threats came instead from birds that in other circumstances would be their guardians. The predated corpse of an adult Oystercatcher was found in mid June 5 metres from Great Blackbacked

breeding regularly in Scilly. Nesting was recorded on Tresco in 1923, but not repeated until 1958, when a pair bred on Samson. Since then numbers have increased, and in 1968 the breeding population was judged to be about 12 pairs. In 1974 at least 8 pairs were located, single pairs on Tresco, St Mary's, Gweal, Annet and Great Arthur in the Eastern Isles, and 3 on Samson; further pairs were probably present in the Tean/St Helens area. Of 7 accessible pairs, breeding success was nil. The cause was undoubtedly predation of young by Great Blackback although not witnessed by myself, it was reported by local boatmen on Great Arthur and on 3 broods at Samson. Similar fates may have befallen young at other sites: on Annet, for example, a single chick was present on 29th May but not seen subsequently, although the parent birds remained around the island until late June.

In all cases Shelducks shared their breeding sites with large numbers of breeding or loafing Great Blackbacks, and a common pattern of predation has emerged in the last few years. Young are intercepted by the gulls as they are escorted by their parents across the water for the first time; breeding success on uninhabited islands like Samson, Annet, etc are particularly vulnerable to threats of this form. Residents of Tresco say that such incidents have become commonplace since the late sixties.

Measures to counter this damage are largely impractical. Although there is some evidence that predation may often be the work of individual specialist gulls - in April and May of 1972 and 1973 one gull was seen to regularly quarter Porth Hellick Lake on St Mary's - difficulties in identifying the predatory individuals at most sites, especially around Tresco Channel, would make selective elimination at best haphazard and probably ineffectual. The high level of predation has reduced Shelduck numbers in this and past years, and is likely to further diminish them in the future: chick losses can only be regarded as a regrettable but unavoidable feature of the dominance of Great Blackbacked Gulls in Scilly.

MALLARD

Mallard are the most numerous duck in the islands, breeding on Tresco, St Mary's and elsewhere: the population does not exceed 80 pairs. Damage from gulls in 1974 was noted at these two areas, and also probably occurred on Annet.

At Porth Hellick, St Mary's one of 3 pairs that attempted breeding were successful. Predation was considered to be responsible for the disappearance of at least 6 young from the first two broods. The third, successful, brood hatched in early June rather than in late April and early May, and it is possible that this pair was successful, raising at least 5 young to the flying stage, because visits by marauding Great Blackbacks at this stage would have been limited by their own breeding commitments.

On Tresco damage to stocks of ducks on the Great Pool has been known and resented by the estate's gamekeepers for many years. All 3 *Larus* species have been seen actively searching out eggs and young, and as with other gull damage Great Blackbacks are the main culprits and Lesser Blackbacks the least frequent of the three. Chicks are usually hunted in the fashion of Harriers, the gulls quartering the reeds and pools until the prey is spotted, and the young forced to dive repeatedly until exhausted. The Keepers reckon that in poor years as many as

CORMORANT

5 predated corpses of young Cormorants were found on Melledgen and Illiswilgig in May, 3 birds at the first site and 2 at the latter. All were under 10 days old, and a visit in late June to Mincarlo revealed no corpses: it may be that predation is limited to recently hatched young, that can be swallowed and digested more easily than larger birds. The small numbers of Cormorants that breed in Scilly do not constitute an adequate food supply for Great Blackbacked Gulls, and predation is no more than casual and opportunist. At both Melledgen and Illiswilgig slain young tended to come from nests on the peripheries of the colonies, and it seems reasonable to assume that damage is mostly limited to inferior nest sites. The stability of the Cormorant's population in the islands suggests that sporadic predation has had little impact, and the conclusion is reinforced by the continuing occupation of Melledgen, where Great Blackbacks have increased by about 90% since 1964. The dangers of exceptional devastation arising from unauthorised landings at breeding sites are outlined in notes on the species on page 11.

SHAG

24 predated corpses were found during 1974, 18 on Rosevear and 6 on Annet. In general Shags are well protected from predation by gulls, with concealed nest sites and different choice of nesting habitats. A comparison of Maps 14 and 7B shows how on Annet Shags are mostly concentrated on rocky outcrops and cliffs, terrain outside the Great Blackbacks' distribution: this pattern is standard at most breeding stations.

The high level of predation on Rosevear was the product of a combination of abnormal breeding conditions and terrain. Here Shags and Great Blackbacks nest together in a density not found elsewhere in Scilly, at times within 10 metres of each other as space is limited; while some Shags enjoy protected sites under boulders and corrugated iron sheeting, others nest in the open much in the fashion of Cormorants. Predation mostly involved young from these exposed areas: on 18 June, for example, 4 freshly killed young were strewn around nests on level sites within 10 metres of breeding Great Blackbacks, and similar circumstances were noted on 23 July. In contrast, there were no predated young on the latter date at Melledgen, where the ratio between the two species is roughly equivalent but protected nest sites far more numerous.

Predation on Annet concerned birds that displayed unusual behaviour. 4 young, and a week later a parent bird, were killed in mid-July, and these originated from an exposed nest 6 metres from a pair of Great Blackbacks, much the least sensible site chosen by any Shag on the island. The other victim, an adult but perhaps not breeding, persistently perched on the thrift near Annet Head from late June onwards: the resident pair of Great Blackbacks eventually took objection to the intruder, and the Shag was killed but not skinned on 15 July.

No predated corpses were found elsewhere. Great Blackbacks in 1974 were no more than a casual threat to Shags; at least some of the victims serve as fine examples of the laws of natural selection in action.

SHELDUCK

The Shelduck is a comparatively recent addition to the list of the species

coincided with suitable nesting grounds for gulls immediately inland. Significant quantities of casts from predation, numbering 8, and more, were found by beaches B, F, H, I and J. When the variation in sizes of these areas is considered, it is apparent that predation along the 20 metres of beach B, where at least 90 pairs of Petrels bred in 30 metres of rocks, was in fact low; similarly the 9 remains around beach B, probably the work of just 1 pair of gulls, must be seen in the context of 70 metres of suitable breeding habitat for Petrels. At both these sites predatory behaviour involved less than half of all pairs of Great Blackbacks nesting directly adjacent to the beaches: the same is true of those around beaches D, G, H, and J, where breeding density was high, less than 7 metres separating each nest; the low level of predation at beach E was undoubtedly to a very sparse population of Petrels.

In contrast, where gull nests were situated more than 8 metres apart, along beaches A, C, F and I, predation involved half or more of the resident pairs: at site A, 75% took Petrels, at site C 66%, and at site I 100%, and all were nesting more than 18 metres from their nearest neighbours. 3 of the 4 pairs of Great Blackbacks that killed Storm Petrels on 3 or more 8 day periods also came from these areas.

A clear equation may therefore be drawn: where Great Black density is high, the proportion of birds indulging in predatory behaviour is low; where density is low, the proportion of predatory birds is high. Reasons for this are not hard to find. In areas of low density gulls are not inhibited by the presence of potential rivals nearby; the individual breeding territories are larger, and so they have easy access to a wider area of Petrel nesting habitat; less time is needed to defend their territories as accidental intrusions by neighbours occur infrequently, and so more time may be devoted to catching the odd Storm Petrel - fewer commitments to the defence of the territory may be especially relevant at night, as squabbles between pairs occurred with some frequency during the hours of darkness along the well populated shoreline south of Carn Windlass.

The Great Blackbacked Gull population of Annet is at present stable, if not declining very slightly - see page 30. It would be unwise to rule out future increases, but on the above evidence the effect of these might well be to further reduce predation of Petrels. The trend of increasing specialisation on Storm Petrels feared in 1965 has not taken place, and the smaller quantity of remains found in that year, 50 as opposed to 100 in 1963, was probably a reflection of increased density following the rise of 25% in the total Great Blackback population between the two years.

Taking the amount of predation in 1974 in isolation, it is clear that the 100 casts found, many of which may have contained non breeding or visiting birds, constituted a insignificant percentage of the 1800+ estimated breeding pairs. So there is no need for control measures against the preying gulls, especially as these are likely to become subject to natural checks. However, if implemented the control measures recommended against Great Blackbacks nesting at the south western corner of Annet, in order to protect the nearby terns will eliminate the predatory pairs along Storm beach B. In addition to relieving the little pressure there is on the Petrels at this site, it will be interesting to see if, as expected, there is a complete absence of pellets here in 1975.

No casts containing Petrels were found on Rosevear - a traditional site no longer occupied by breeders but most probably still visited - or elsewhere.

FIGURE 1 :-

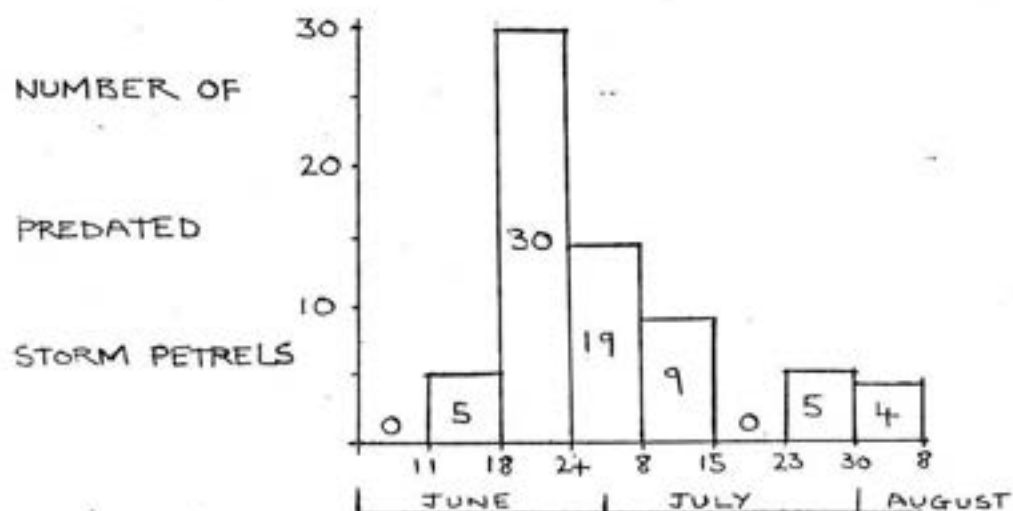


FIGURE 2 :-

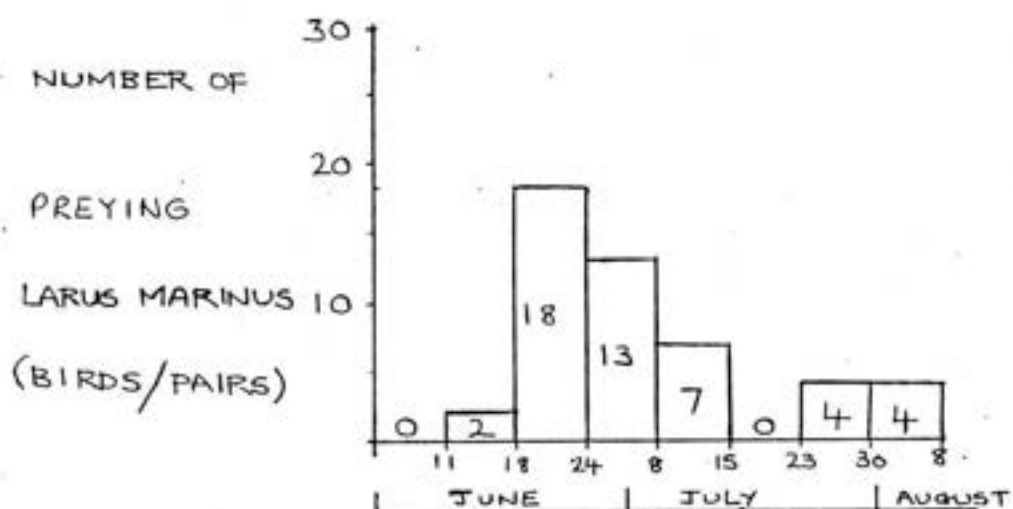
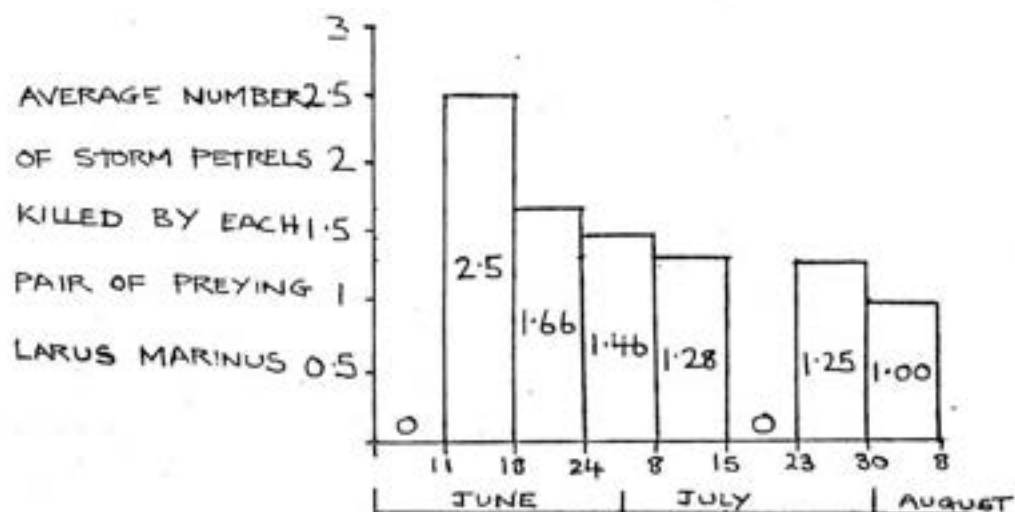


FIGURE 3 :-



killing 5 or more birds in the course of the breeding season - involved only 4 pairs of gulls. To my mind there are two reasons for the limited form of predation in 1974. Firstly, the speed and agility of Storm Petrels in flight present almost insuperable problems for potential marauding Great Blackbacks, and they are only really vulnerable on landing. Observations by torchlight on many returning birds showed that the majority do not linger on the rocks, but enter and exit quickly, thus denying their predators much opportunity to catch them in the process. I think therefore that most birds are taken almost by accident; the Petrel would have to either present itself to or collide with its killer to constitute an easy victim. As mentioned in the preceding paragraph it seems reasonable to suppose that injudicious behaviour would be shown mostly by immature and non breeding birds: visitors from other colonies might also be involved.

The second and equally important reason is that the food value of a Storm Petrel to a Great Blackback is small, especially when compared with other sources of food like Manx Shearwaters or young Rabbits, to say nothing of fish, crab and intertidal foods. Figure 3 shows the average number of Petrels consumed by preying Great Blackbacks in 6 eight-day periods: the average taken by the 29 pairs from June to August was 2.6 birds each. This amounts to an insignificant proportion of all food consumption: for Storm Petrels to make up, say, 25% of a gulls' diet, it would have to hunt and catch a minimum of 2 petrels each night, irrespective of the fluctuations and problems of availability outlined above. It may be said that Storm Petrels, despite the fact that they are the most numerous breeding species on Annet, do not constitute an economic food supply for the Great Blackbacks.

Predation of Storm Petrels was first recorded on Annet in June 1914, when a few pellets were found. More recently, in 1952 and 1962, small numbers of gull casts containing Petrels were discovered, but these did not exceed 12 or so specimens in either year. A marked increase was noted in 1963 and 1965, when short stays in June of both years revealed at least 100 and about 50 Petrel remains respectively. These were all located in the southern half of the island, and the rise in fatalities from gull predation was clearly correlated with the colonisation of this part of Annet by Great Blackbacked Gulls from 1963 onwards: until that year the latter nested almost entirely on the northern half of the island.

Given that the total Great Blackback population has increased from c150 to 378 pairs over the last 11 years, and from c30 to 67 pairs at the southern part, the number of Petrel remains found on Annet in 1974 were surprisingly few compared with 100 odd in 2 days on a smaller section of the island in 1963: it does not seem that the increase in potential predators has resulted in increased damage. There is no evidence that the Storm Petrel population has declined in the intervening years, and so it may be postulated that predatory behaviour by the gulls has been modified.

Work in 1974 has produced an explanation for this: while the scale of predation may fluctuate from year to year, the following is, I think, a convincing reason and an interesting result of the increasing gull numbers. The numbers of Storm Petrels remains along the storm beaches was related not only to the occupation rate of the Petrels' breeding areas but also to the nesting density of the Great Blackbacks. Map 16A describes the number and frequency of nests adjacent to storm beaches on the south shore. The average distance between all nests along the 2400 metres surveyed was 25 metres, and average distances next to Petrel colonies were between 5 and 28 metres - storm beaches usually

'belt' above the shoreline from the southernmost tip of the island to its western extremity, Carn Irish. The location of casts containing petrels were marked with stakes and all remains buried so that accurate counts of predation could be made at all times; notes were taken on the approximate dates of death and the relationship to Storm Petrel and Great Blackback nesting territories. Results are given on Map 16. Surveys of the rest of Annet were less comprehensive, but whenever ashore a general watch was kept for petrel remains especially away from the shoreline and suitable storm beaches. The location of these pellets are also included in Map 16; although not comprehensive, they do indicate the overall location pattern of predated birds. Unlike the situation with Manx Shearwaters, it does not seem that a significant proportion of petrels were regurgitated away from the gulls' breeding territories, and so 'Lost' castings would not be a source of error.

Map 16 shows the relation of predated corpses to Storm Petrel breeding areas. It is immediately apparent that these were almost always located adjacent to suitable storm beaches: of the 79 remains found along the regularly surveyed area, 90% were within 10 metres of their nesting habitat. All were situated in Great Blackback breeding territories, and so it is clear that Storm Petrels were typically killed by the gulls because of their close proximity. Thus Great Blackbacks evidently ignored petrels if catching them involved moving away from the breeding territory: the distribution of remains around Annet Head does not contradict this, as the rocky outcrops, and probably the clifftops as well support small populations of petrels. Map 16A gives the number of pairs of Great Blackbacks nesting along the survey area. Direct access to Petrel colonies limited predatory behaviour to 29 pairs, less than 30% of the 93 pairs nesting close to the southern shoreline.

The number of petrels predated over eight 8 day periods is given in Figure 1. Fatality was low and sporadic before mid-June and after mid-July but, 80% were killed during the month from 18th June onwards, when 75% of all preying Great Blackbacks were operating. One explanation for the high level of predation at this time suggests itself: the exploitation of Storm Petrels as a supplement to the usual diet while the gulls were provisioning their young as well as themselves. However, analysis of the breeding progress of preying Great Blackbacks on 24th June showed that less than 40% of the pairs had any surviving chicks to feed, and so this does not really explain the peak over the previous week: one pair of gulls which accounted for 9 Storm Petrels before early August and a further 3 at the end of that month lost both young between taking their second and third Petrels. The peak in predation would seem therefore to tie up with the breeding behaviour of the Petrels rather than the gulls: the second half of June is the usual time for egg-laying, and the birds may have been more active around the colonies at this time - unlike Manx Shearwaters, nest relief is fairly frequent, taking place every 2 or 3 days. A sizeable number of victims might also have been non-breeding or less experienced immatures which are less adept at avoiding the attentions of the gulls nearby.

The overall picture that emerges is one of casual and mostly intermittent predation, conditioned as much by the Petrels' presence around the gulls' breeding areas as other factors. Even amongst preying Great Blackbacks nesting virtually on top of Petrel colonies, specialisation -

MANX SHEARWATER

23 Manx Shearwaters killed by Great Blackbacked Gulls were found on Annet between 15th May and 23rd August. Predation may have been higher, because some victims are eaten on the sea and the corpses lost, but remains on Land give a fair indication of its scale. The location of skins are shown on Map 15.

As is obvious, no significant specialisation by Great Blackbacks occurred, and predatory behaviour involved less than 5% of the Great Blackback population. All the evidence suggests that Shearwaters formed a negligible part of the gulls' diet: only 2 corpses were found beside nests, and most were scattered apparently at random over breeding territories; none were found in standing grounds. Predation was therefore casual and opportunist, and this is reflected in the location of the Shearwater remains. 37% were around rocky outcrops which would give gulls strategic positions from which to spy out the surrounding land: the greatest number of corpses, 4 around Carn Windlass, were at the rock that dominates the southern half of the island. Of the other remains at least 8 were situated on other high ground around Annet Head or on particularly low areas such as along the neck and waist of Annet, both types of areas where opportunities for intercepting Shearwaters might occur.

No recent corpses were found before 18th May, and dates for predated birds were spread evenly over the following 3 months, the only exception being 5 found between 18th and 24th June, which was also the peak time for predation on Storm Petrels: this coincided with the average period for hatching, and so Shearwaters probably paid more visits to land at this time. Correlation of predation with weather conditions was generally not feasible because surveys of the island were intermittent and most corpses impossible to date accurately: however one bird found by a Great Blackback's nest on the edge of the main Shearwater colony by Carn Windlass was killed on the night of 22nd/23rd June, when misty weather brought unusual numbers of Shearwaters ashore.

The past history of predation on Shearwaters contains many remarks like 'enormous numbers are killed...', 'bodies litter the ground at the rate of 20 to 30 in ten square yards', and 'forty corpses within as many feet'. At the present time Shearwater skins may be found annually on Skomer, Pembrokeshire, at a density of between 3 and 9 per acre; in 1971 it was calculated that on one section of the island 49 pairs of Great Blackbacks accounted for c350 Shearwaters between March and October. Compared with the local situation between 1920 and 1940 and with the scale of damage illustrated on Skomer, Manx Shearwater mortality from gull predation on Annet in 1974 was very low indeed. While no counts were possible of predation on young birds, data from Skomer suggests that this would not exceed 20% of the total victims, and therefore not affect the general conclusion.

The most likely explanation for the drop in predation in recent years is that the lower numbers of Shearwaters no longer constitute an economic food supply for Great Blackbacks.

STORM PETREL

About 100 Storm Petrel remains were found in castings from Great Blackbacked Gulls on Annet between early June and August. 1 pellet containing a Storm Petrel was found in the occupied nest of a Herring Gull.

On each visit to the island thorough searches were made of a 15 metre

PREDATIONINTRODUCTION

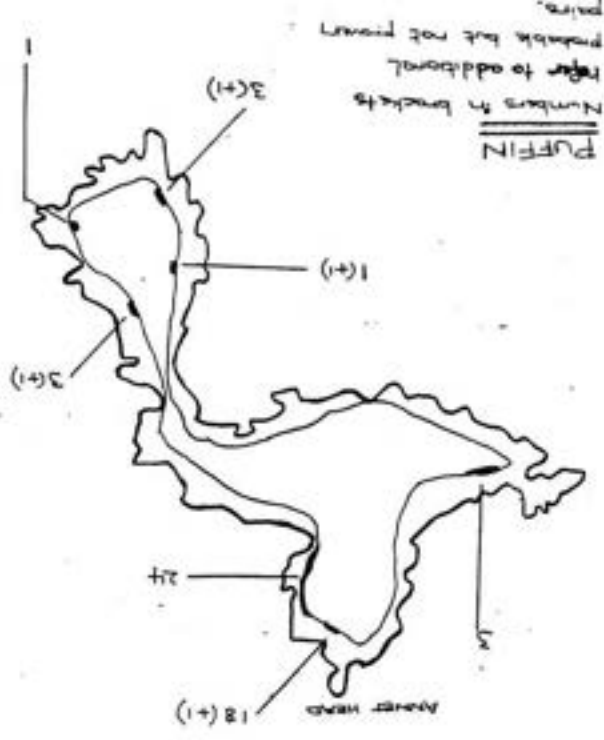
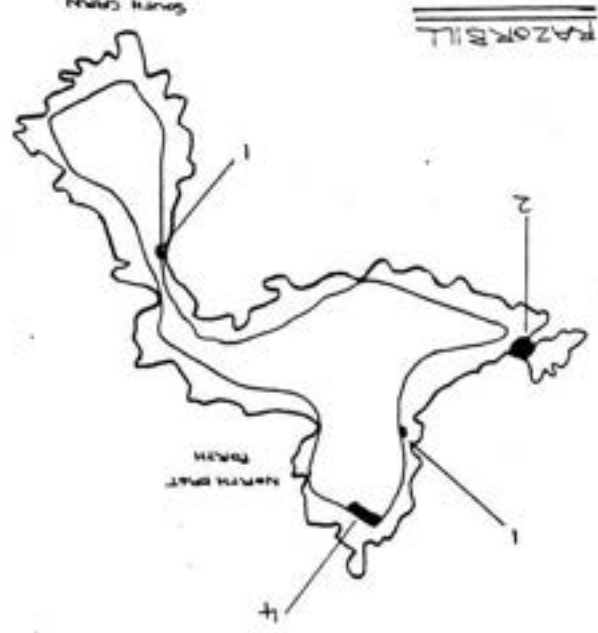
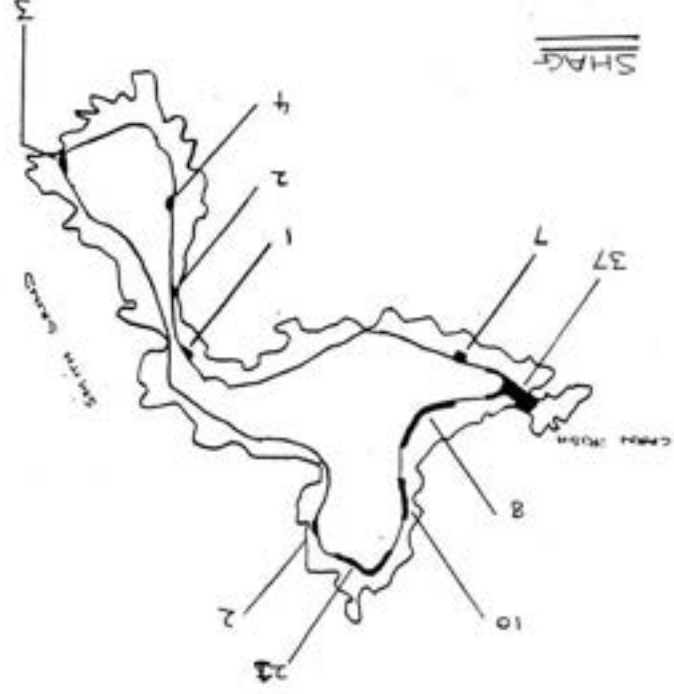
Between May and August 1974 predation by *Larus Gulls* was investigated and the damage caused to other species assessed. Records from about 1920 onwards show that Great Blackbacked in particular killed large numbers of Manx Shearwaters and Puffins, and subsequent declines in the populations of these two birds have been attributed to this cause. Since 1945 little work has been done on the situation other than observations on Storm Petrel mortality from predation between 1962 and 1965, and it was not known to what extent changes since 1945 in the fortunes of the species involved had altered the scale and pattern of predation.

Despite, or rather because of, the lack of hard information about their effect on other birds, many local people have felt for some years that the numbers of Great Blackbacked Gulls in Scilly should be reduced. This is understandable when one considers both the past history of predation and the way in which Great Blackbacks have become strikingly more abundant while birds like Shearwaters and Puffins have declined noticeably. More extreme islanders have advocated ridding the Scillies of all 'Blackbacks': it may be said that antipathy exists between man and bird. Control measures cannot be taken without firm evidence that the species, or individual bird, is doing significant damage to other avian populations. Results of studies in 1974 may go some way in clarifying what has hitherto been a somewhat confused situation and will, hopefully, fumigate some widely-held prejudices and preconceptions.

All incidents of predation are listed below, and these are arranged under the species involved in the Wetmore order of classification. When relevant predation has been referred to on previous pages under the headings of 'Adverse Pressures observed in 1974', and much of the information given is repeated here so that the fullest possible picture is presented; likewise, a postscript is included detailing the sorts of nuisances committed by gulls that further irritate local people. Unless otherwise stated, all references to gulls concern the Great Blackbacked Gull, *Larus marinus*.

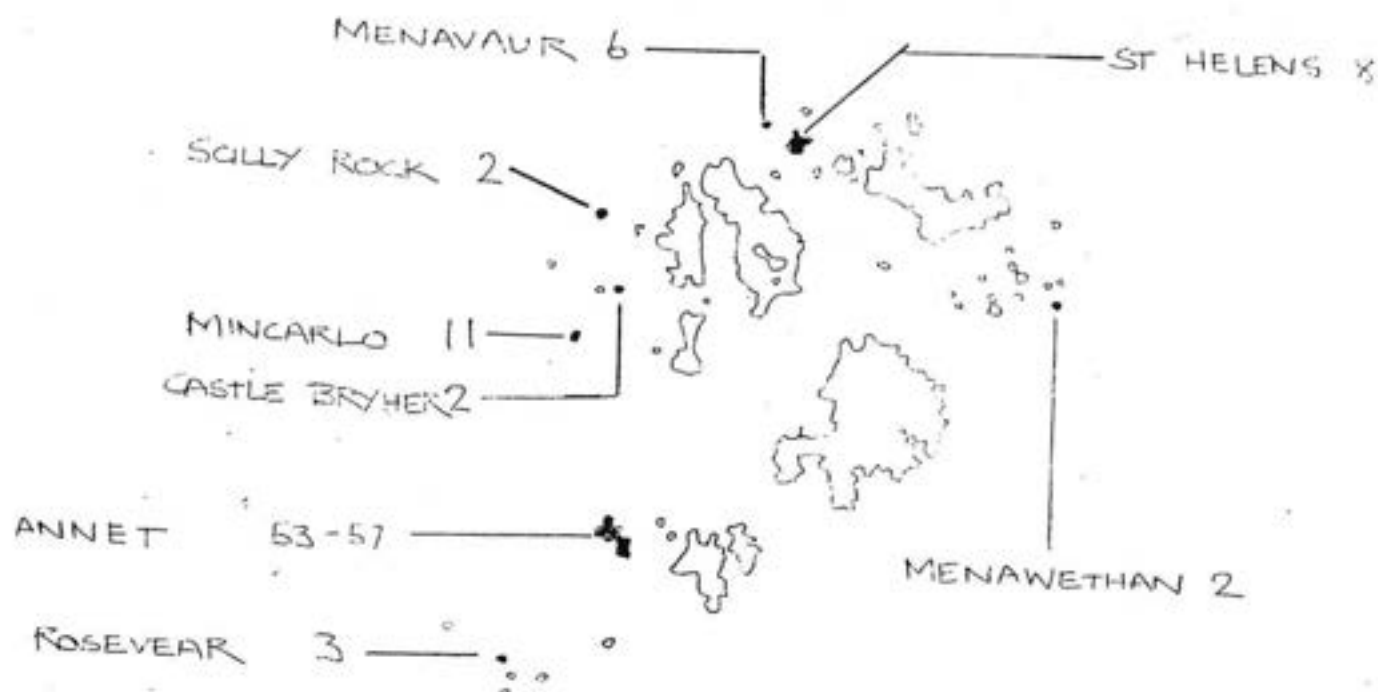
It must be stressed that conclusions are subject to two provisos. Firstly, most evidence is drawn from work over one breeding season only, and the pattern of incidents observed this year may not necessarily be repeated in the next; equally, 1975 may produce behaviour absent in 1974. Secondly, comprehensive coverage of predation throughout Scilly was obviously not possible and most work was done on Annet, the main breeding station for highly valued species like Shearwaters, Petrels and Puffins: results inevitably show a bias towards the situation at this site.

NUMBERS AND DISTRIBUTION ON ANNET OF SELECTED SEABIRDS 1974:—



PUFFIN: DISTRIBUTION OF 87-91 ESTIMATED BREEDING PAIR

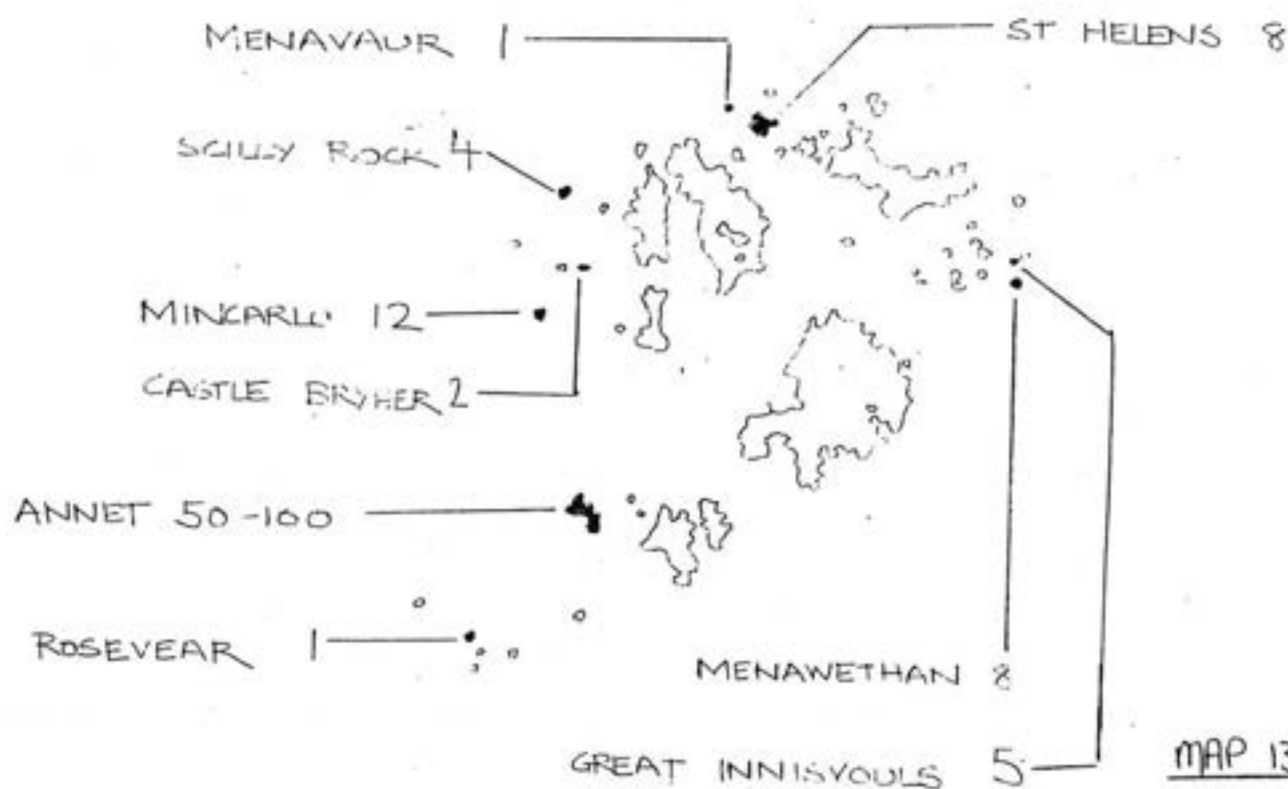
1974



MAP 13

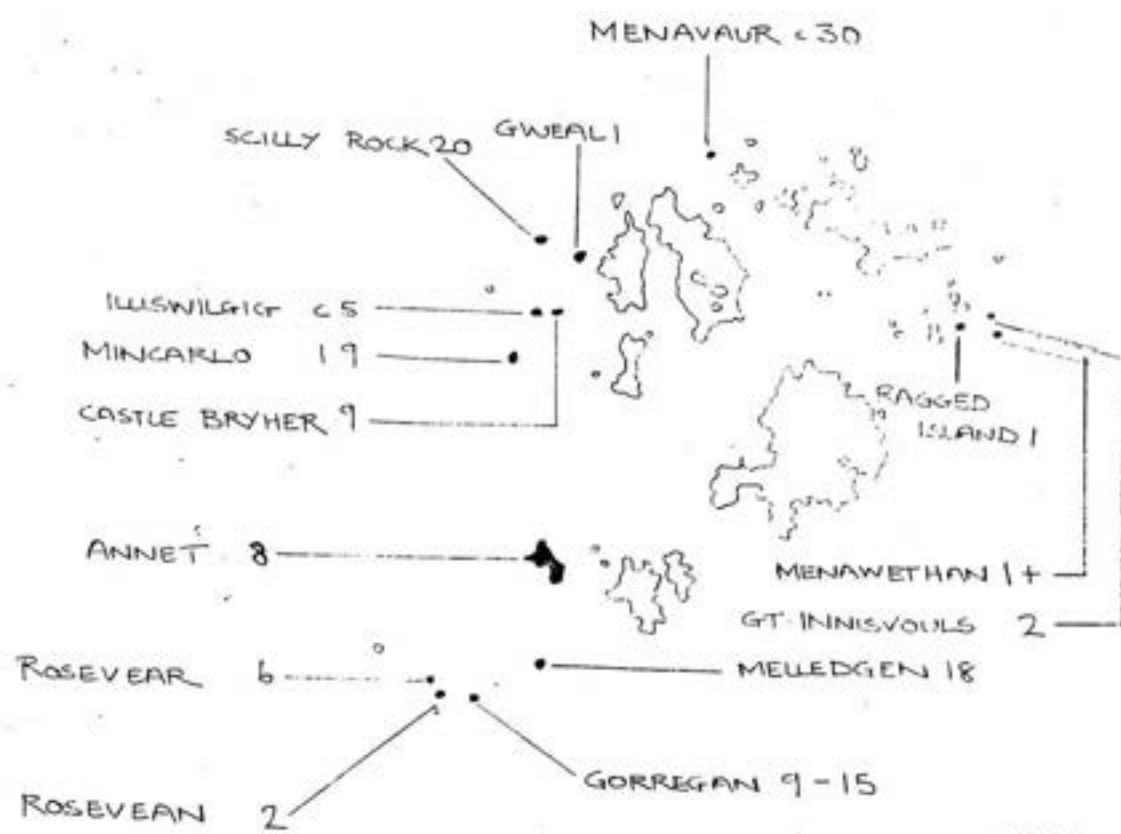
PUFFIN: DISTRIBUTION OF 91-141 ESTIMATED BREEDING PAIRS

1967



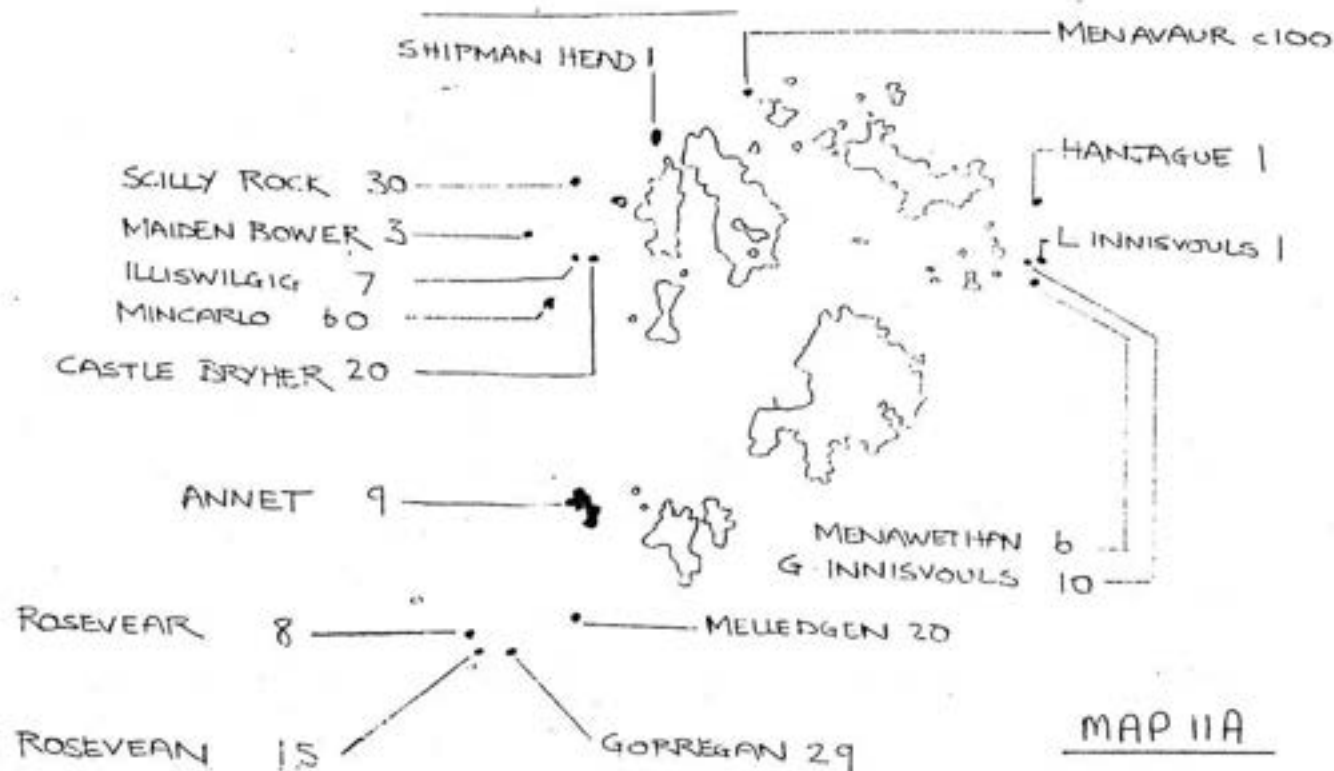
MAP 13A

RAZORBILL : DISTRIBUTION OF 131-137 ESTIMATED BREEDING PAIRS 1974



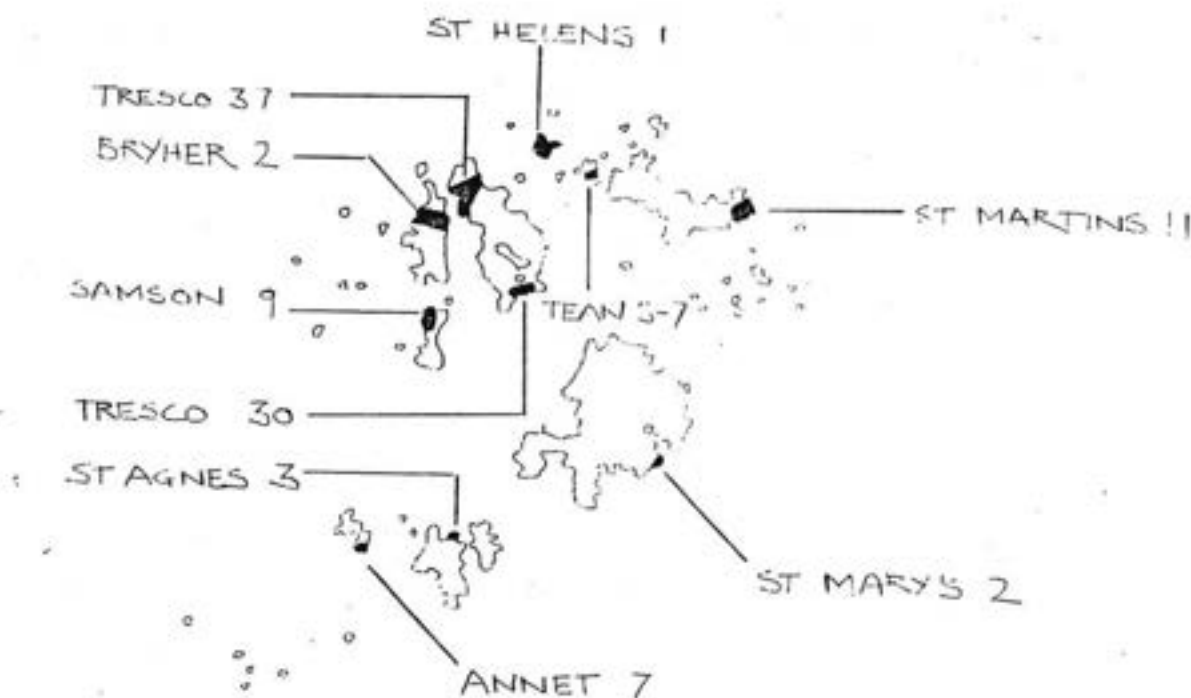
MAP 11

RAZORBILL : DISTRIBUTION OF c 320 ESTIMATED BREEDING PAIRS 1967



MAP 11A

COMMON TERN: DISTRIBUTION OF 107-109 ESTIMATED BREEDING
PAIRS 1974



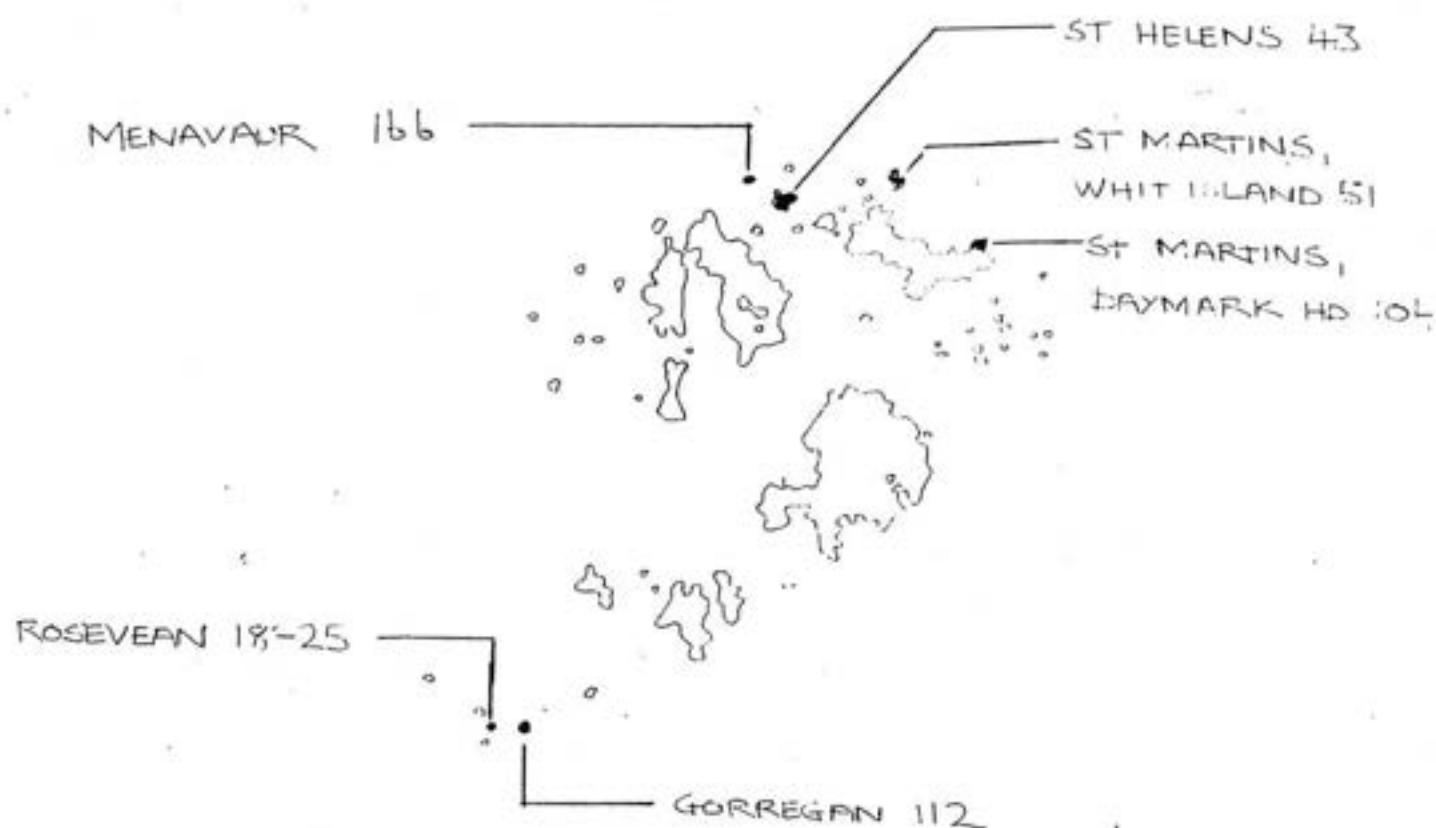
MAP 10

COMMON TERN: BREEDING DISTRIBUTION 1953 & 1954



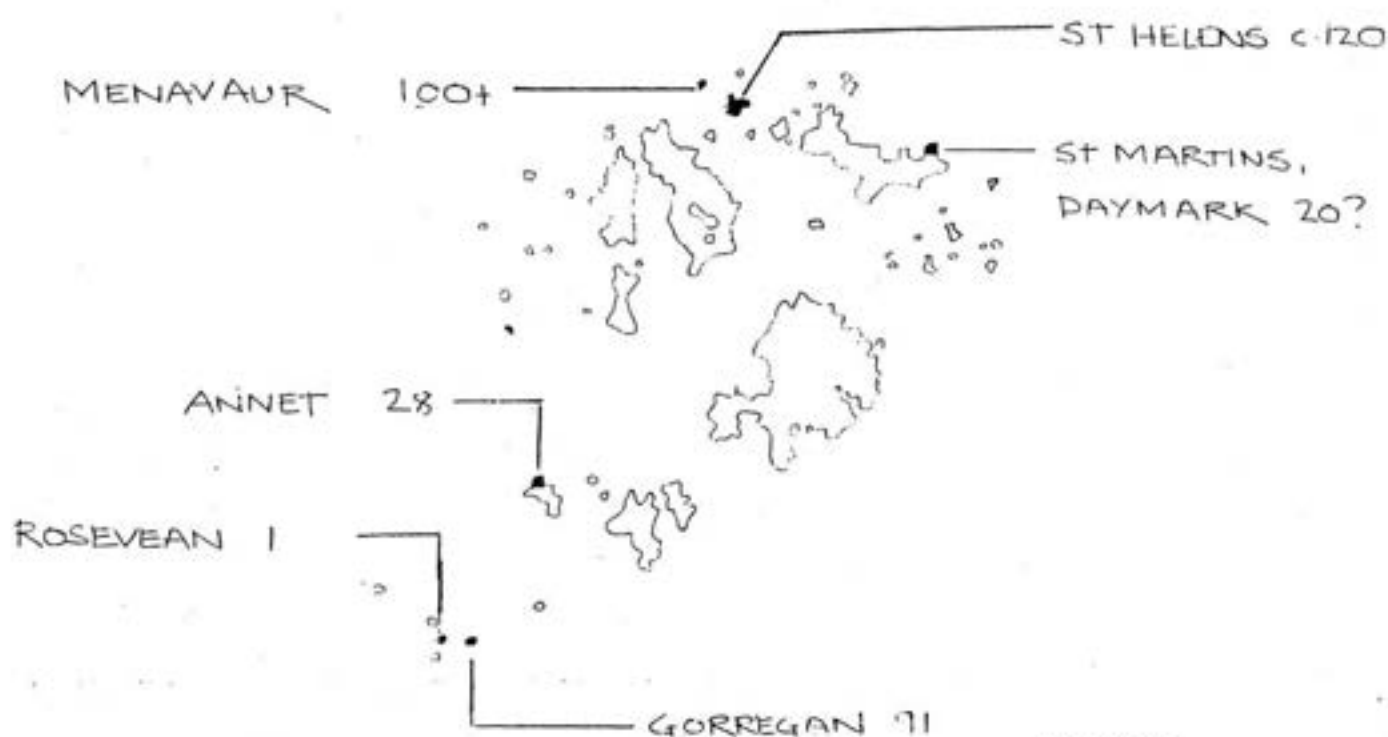
MAP 10A

KITTIWAKE : DISTRIBUTION OF 494-501 ESTIMATED
BREEDING PAIRS 1974



MAP 9

KITTIWAKE : DISTRIBUTION OF c360 ESTIMATED
BREEDING PAIRS 1967



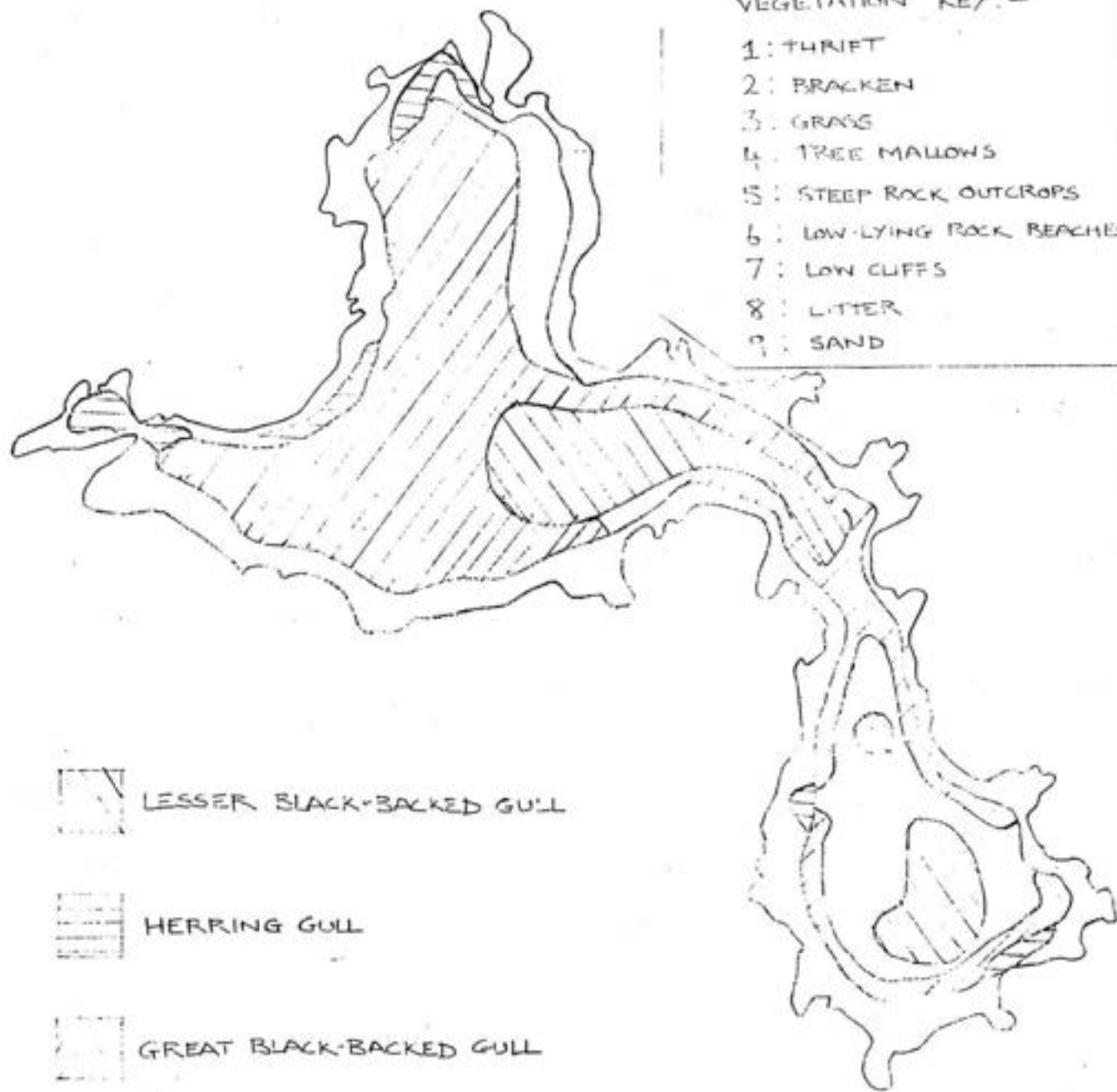
MAP 9A

DISTRIBUTION OF LARUS GULLS IN RELATION TO VEGETATIONAL

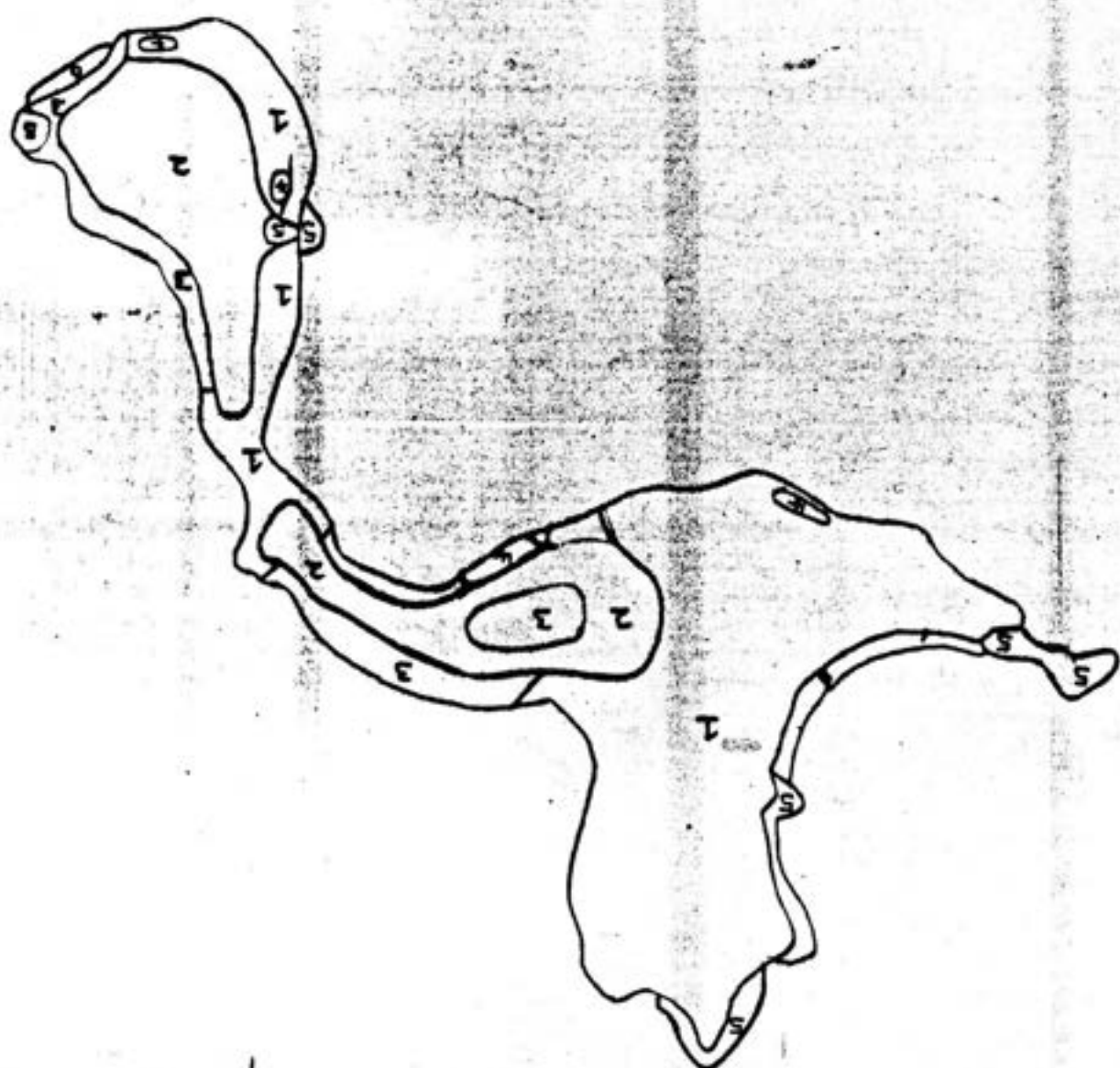
ZONES ANNET 1974:-

VEGETATION KEY:-

- 1: THRIFT
- 2: BRACKEN
- 3: GRASS
- 4: TREE MALLOW
- 5: STEEP ROCK OUTCROPS
- 6: LOW-LYING ROCK BEACHES
- 7: LOW CLIFFS
- 8: LITTER
- 9: SAND

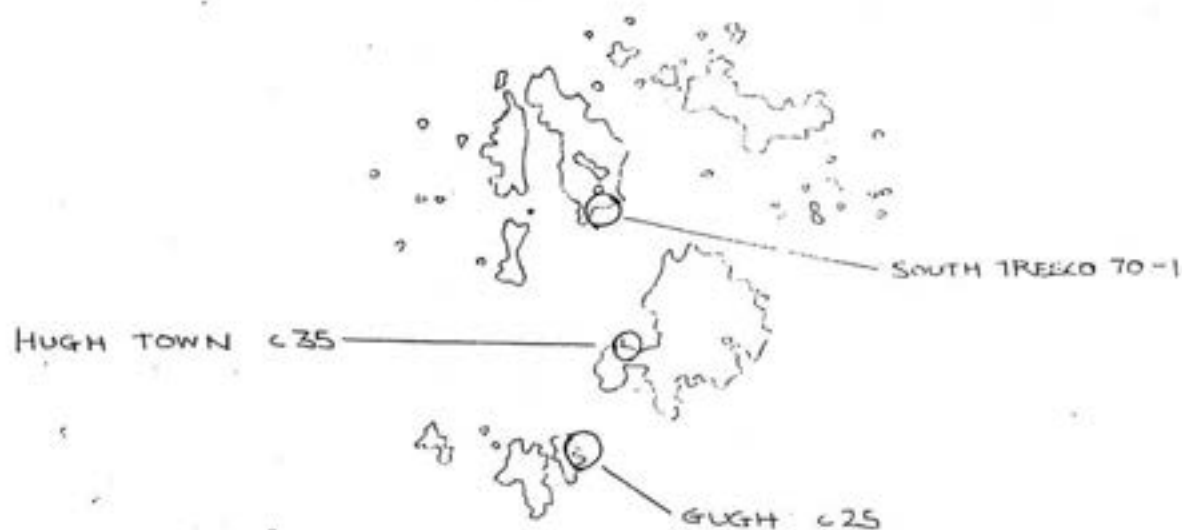


MAP 8



MAJOR CONCENTRATIONS OF RESIDENT BUT NON-BREEDING

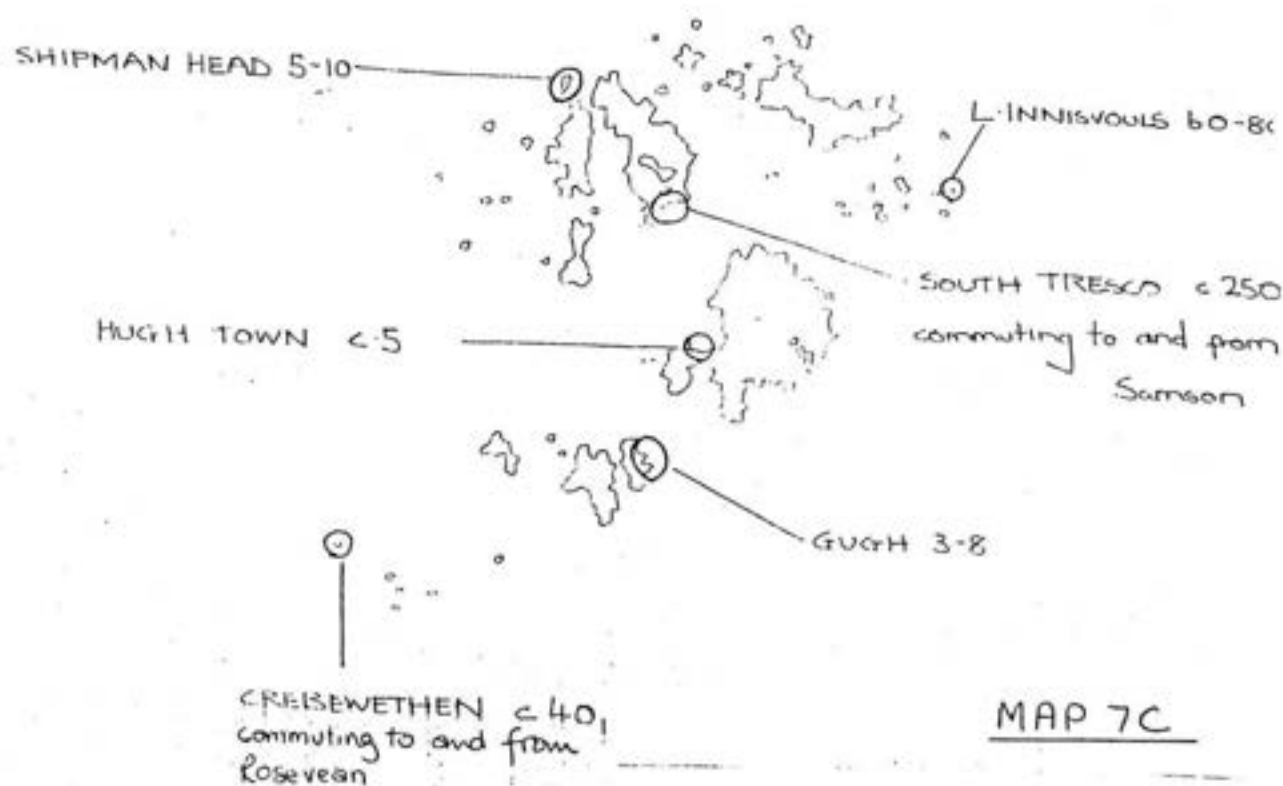
HERRING GULLS IN 1974 :-



MAP 6B

MAJOR CONCENTRATIONS OF RESIDENT BUT NON-BREEDING

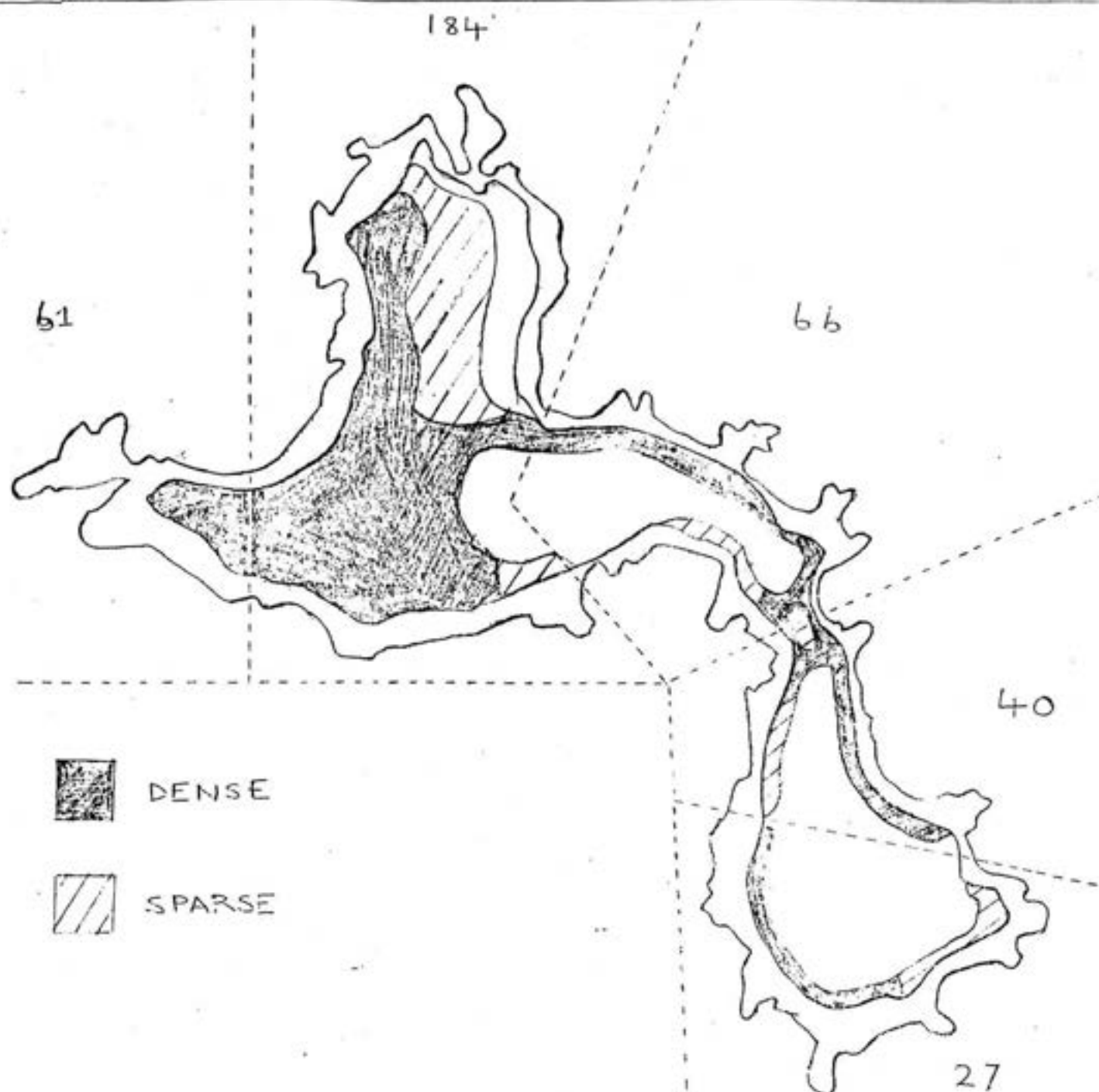
GREAT BLACK-BACKED GULLS IN 1974 :-



MAP 7C

NUMBERS AND DISTRIBUTION OF 378 PAIRS OF GREAT BLACK-BACKED

GULLS ON ANNET 1974:-

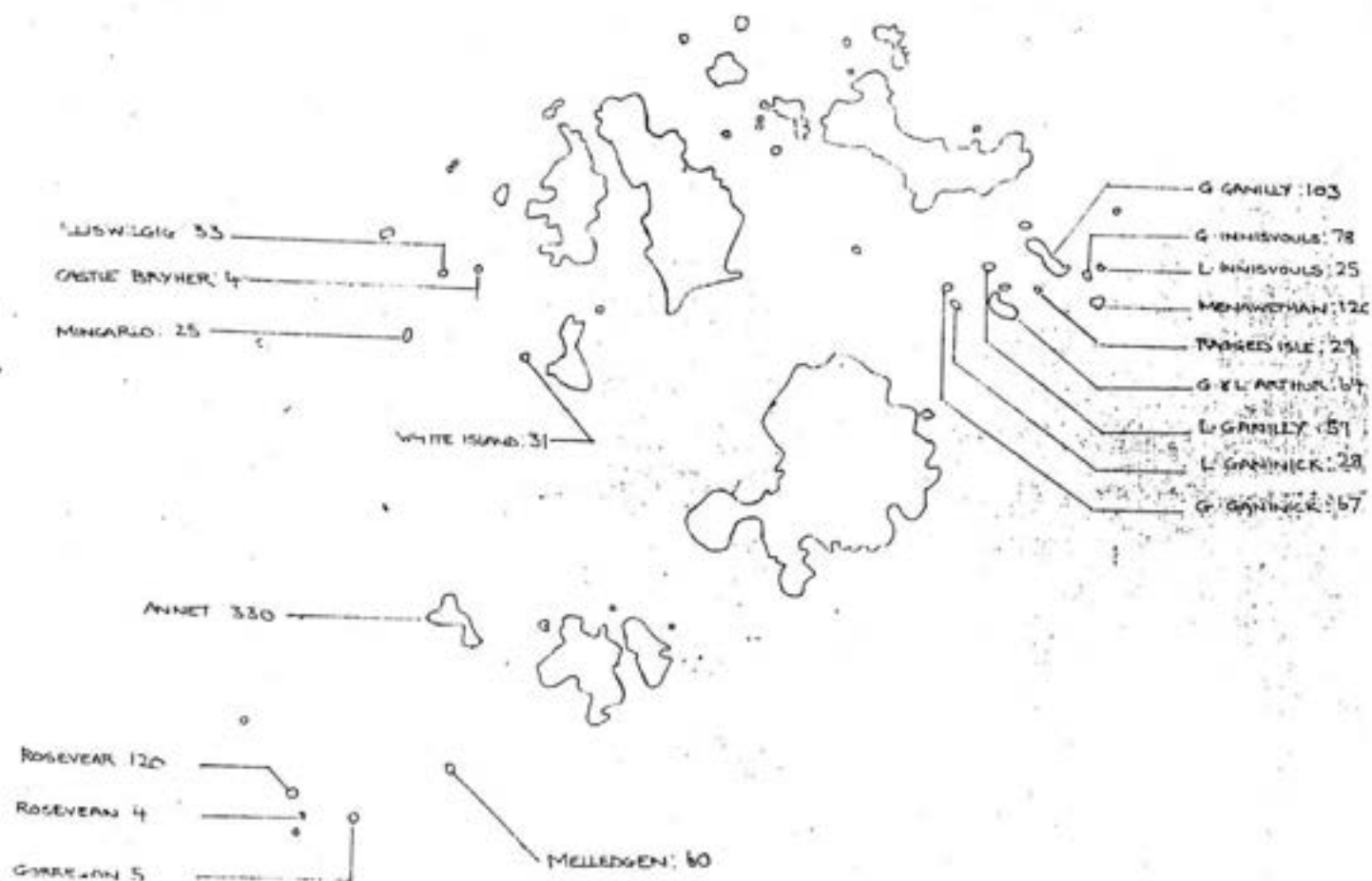


MAP 7B

GREAT BLACK-BACKED GULL ESTIMATED BREEDING PAIRS AT MAJOR SITES 1964/7

FIGURES FOR THE NORTH-EASTERN GROUP AND THE EASTERN ISLES REFER TO COUNTS OF NESTS IN 1964

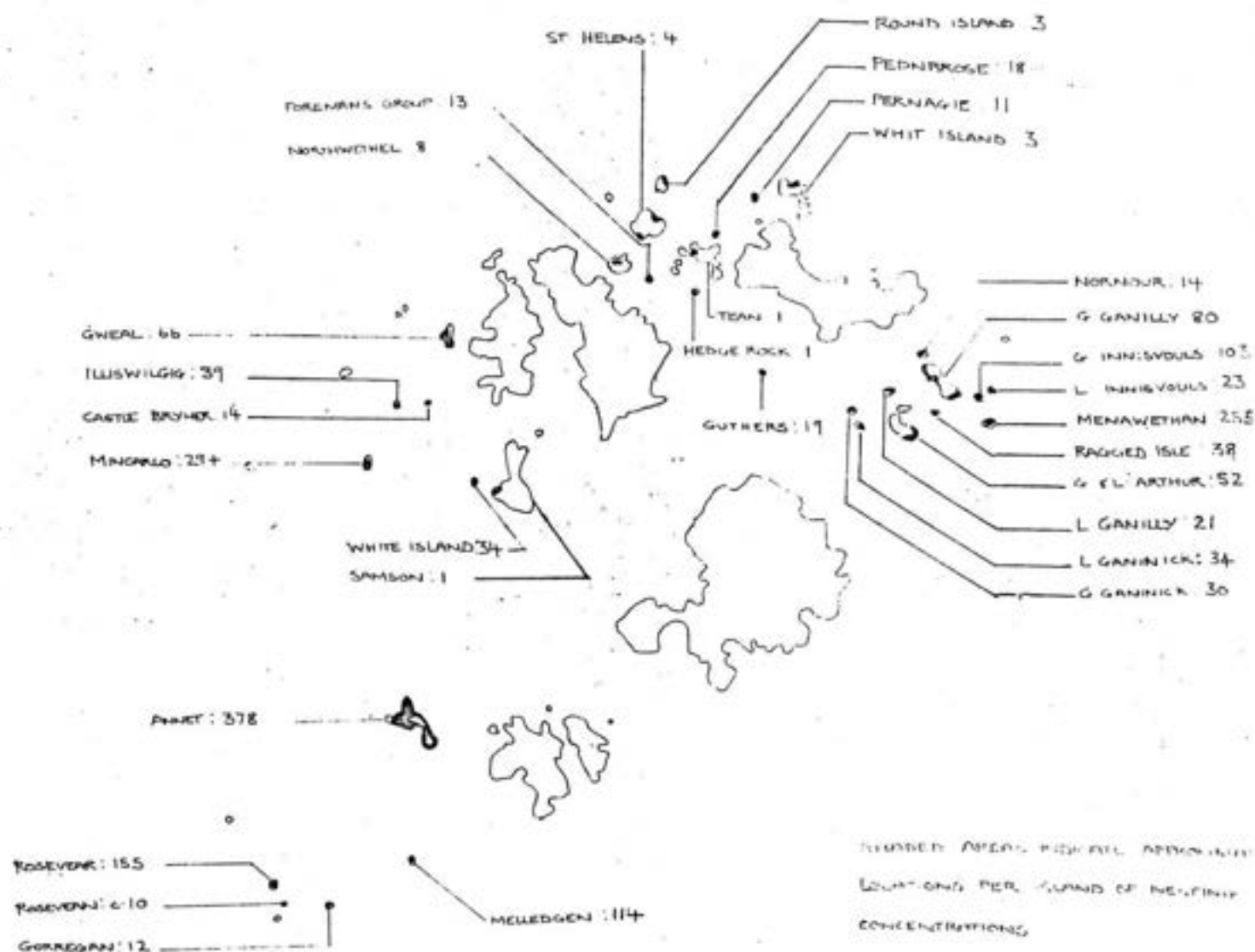
FIGURES FOR THE SOUTHWESTERN GROUP REFER TO ESTIMATES OF PAIRS ON TERRITORY IN 1967



MAP 7A

GREAT BLACK-BACKED GULL ESTIMATED BREEDING PAIRS AND DISTRIBUTION 1974 :-

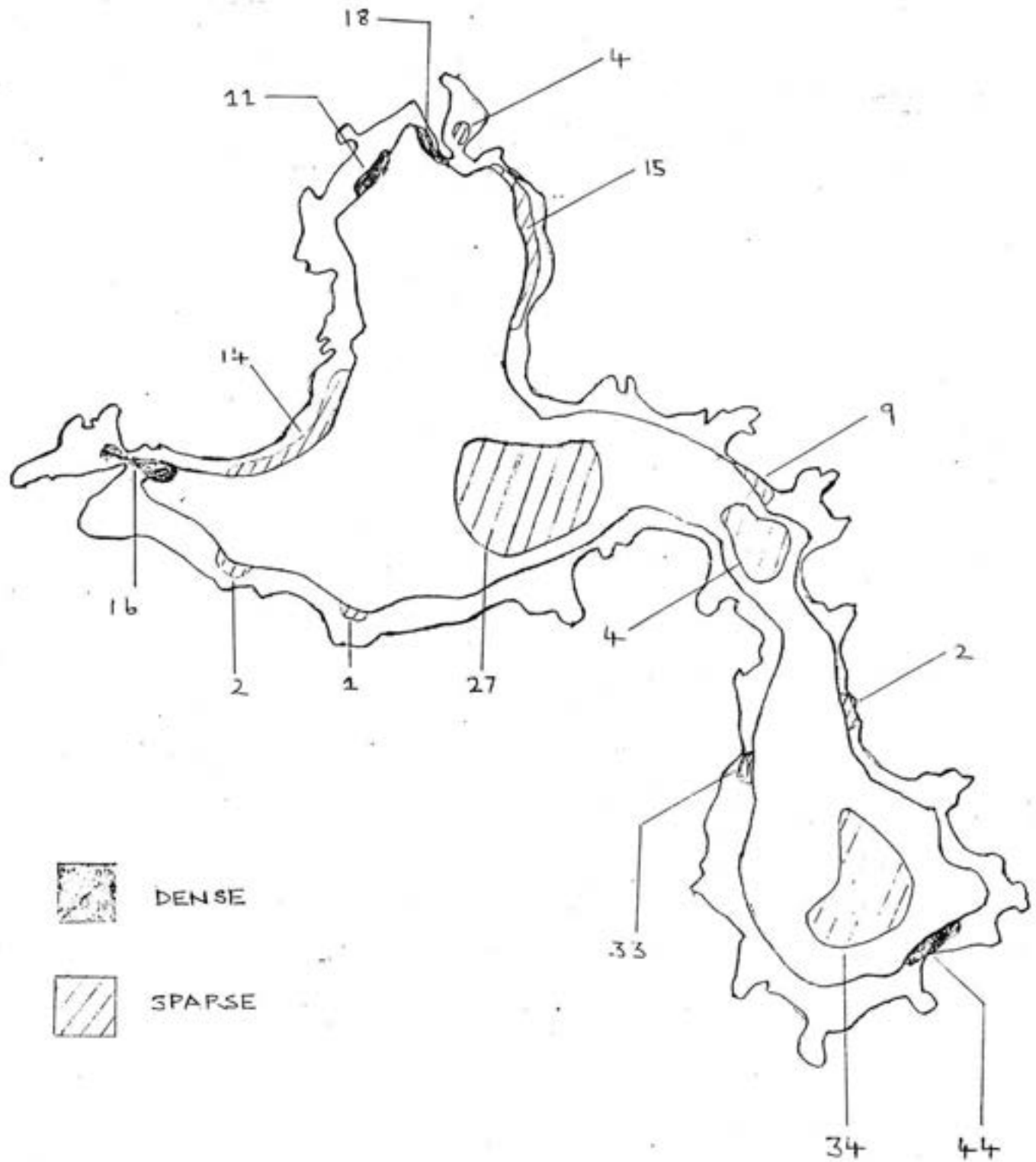
TOTAL OF 1583 PAIRS



MAP 7

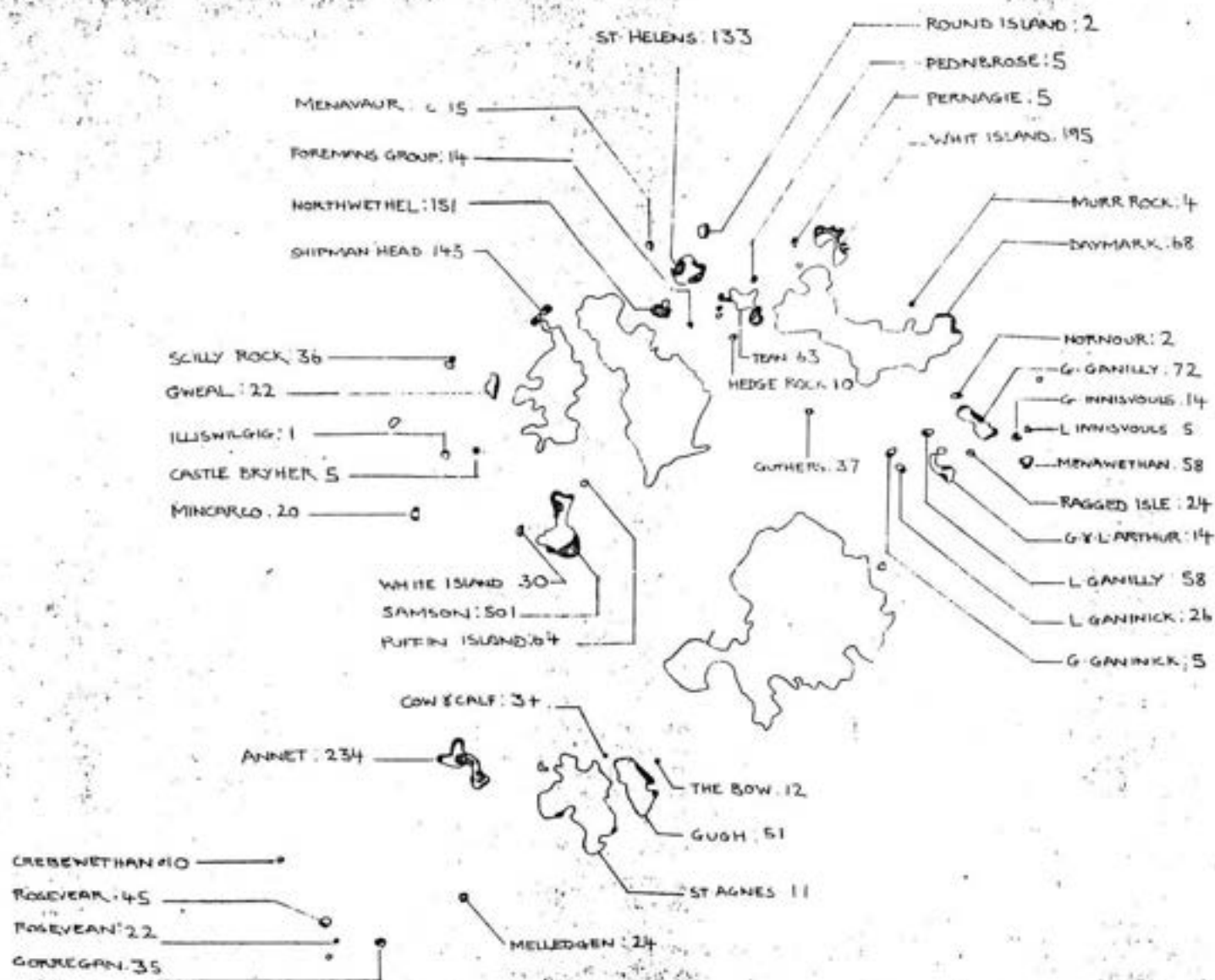
NUMBERS AND DISTRIBUTION OF 234 PAIRS OF HERRING GULLS ON

ANNET 1974 :-



HERRING GULL ESTIMATED BREEDING PAIRS AND DISTRIBUTION 1974

TOTAL OF 2249 PAIRS

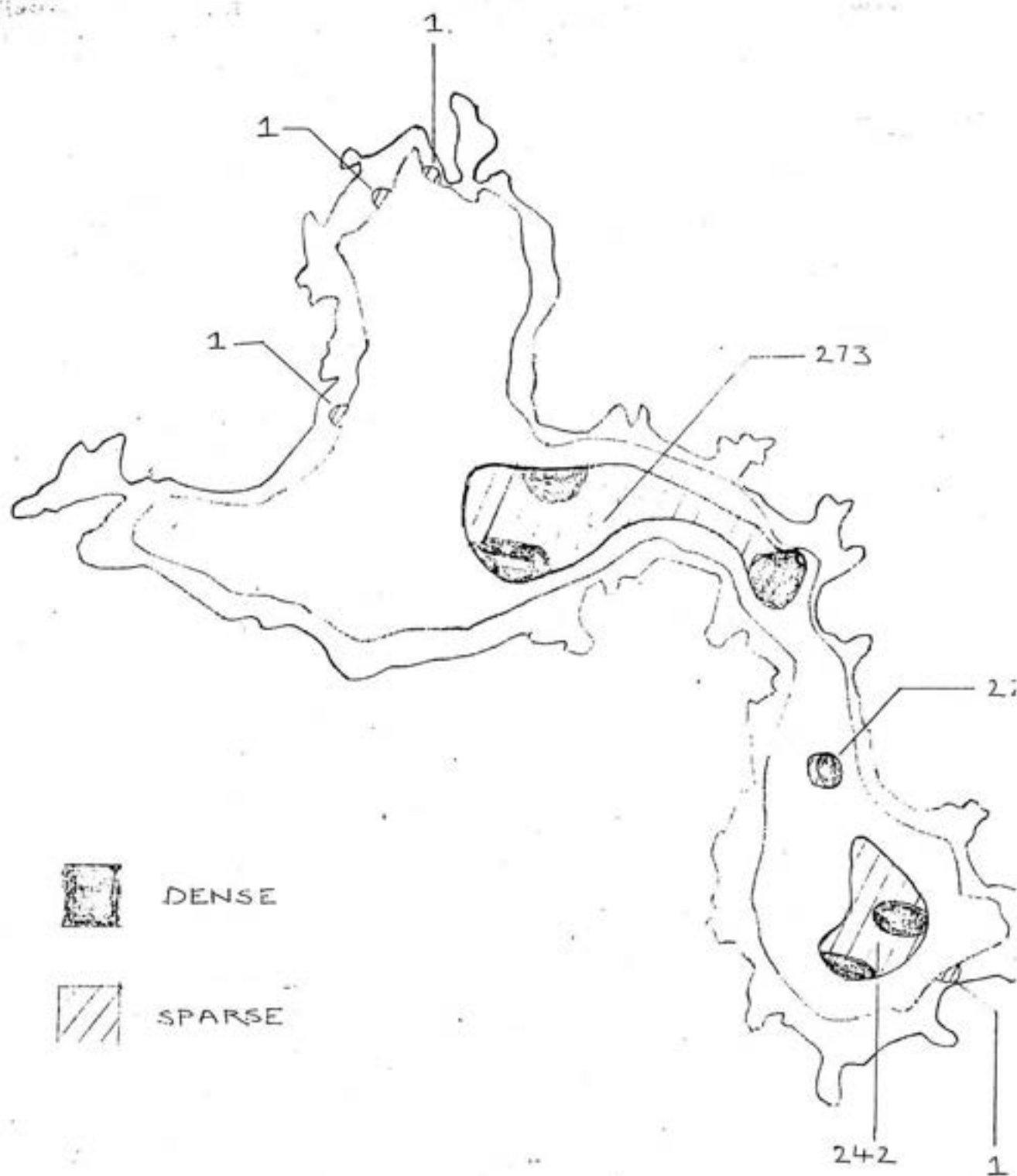


SHADED AREAS INDICATE APPROXIMATE
LOCATIONS PER ISLAND OF NESTING
CONCENTRATIONS

MAP 6

NUMBERS AND DISTRIBUTION OF 541 PAIRS OF LESSER BLACK-BACK

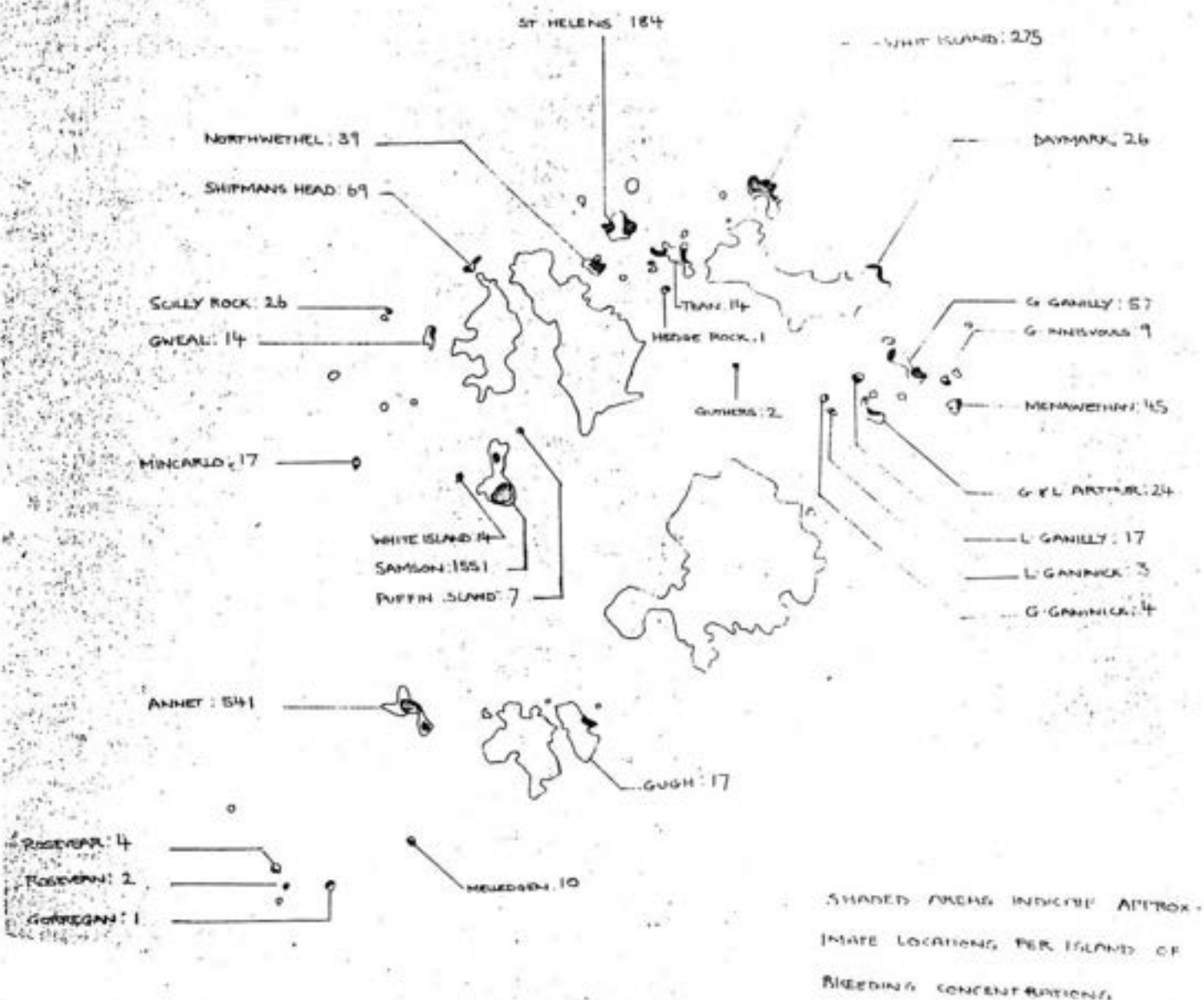
GULLS ON ANNET 1974:-



MAP 5A

LESSER BLACK-BACKED GULL: ESTIMATED BREEDING PAIRS AND DISTRIBUTION 1974: -

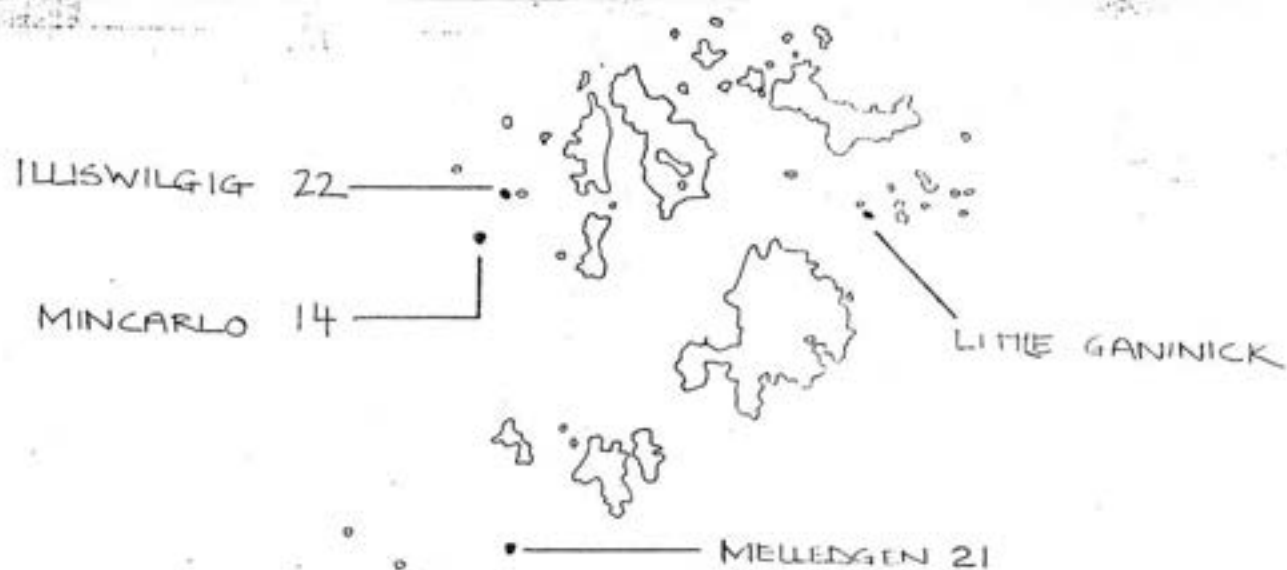
TOTAL OF 2973 PAIRS.



MAP 5

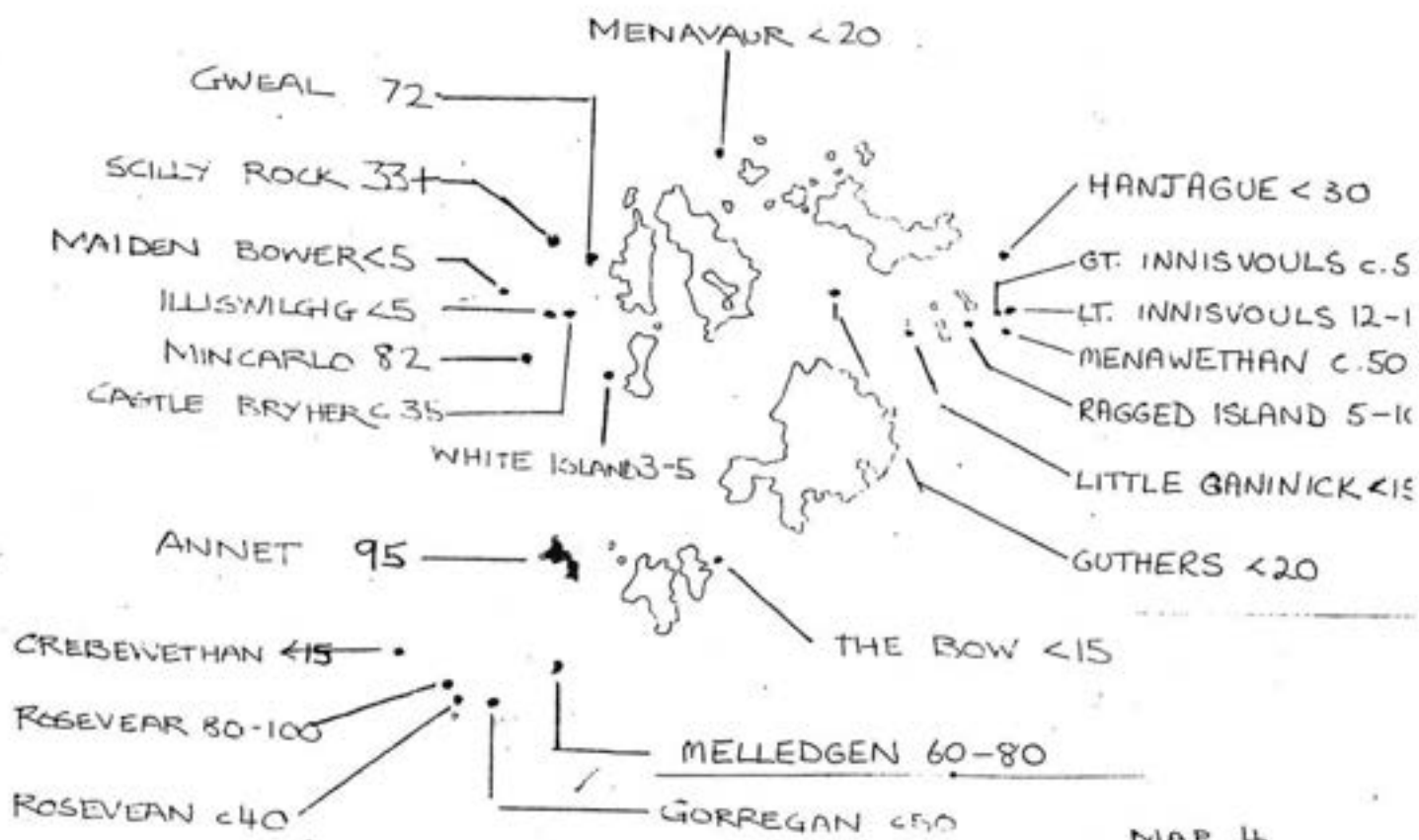
CORMORANT : DISTRIBUTION OF 60-62 ESTIMATED BREEDING

PAIRS 1974



MAP 3

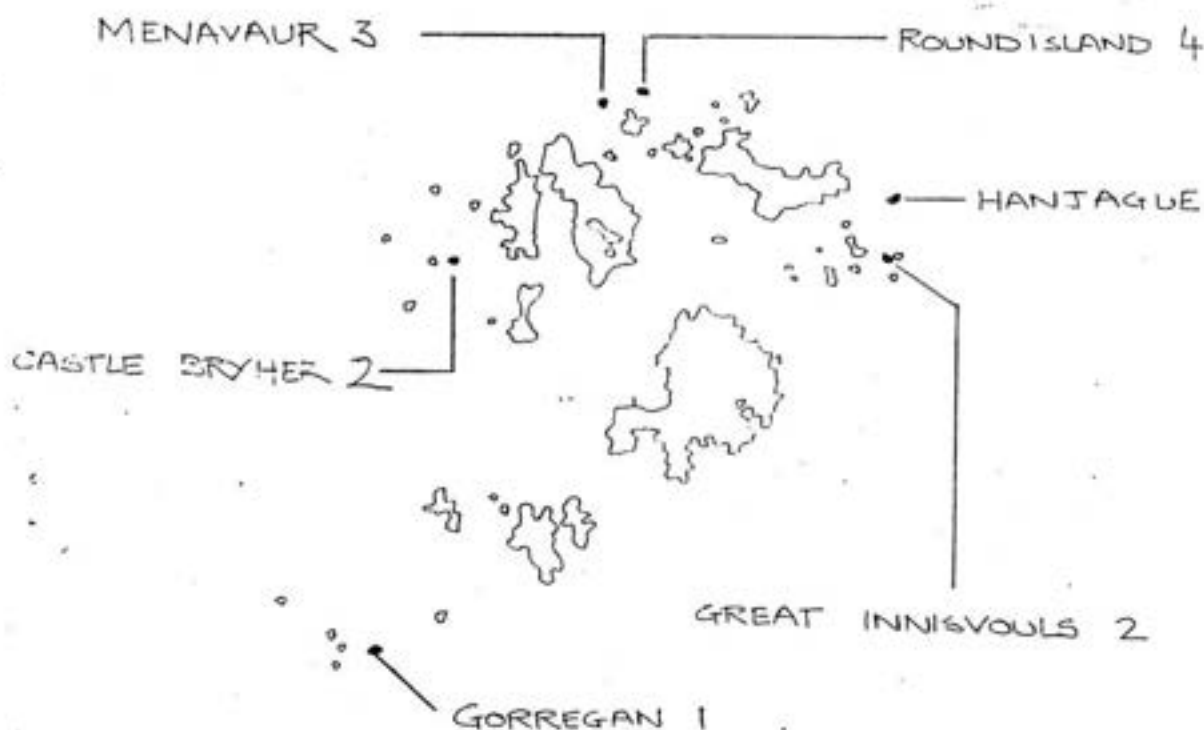
SHAG : DISTRIBUTION OF c. 850 ESTIMATED BREEDING PAIRS
1974



MAP 4

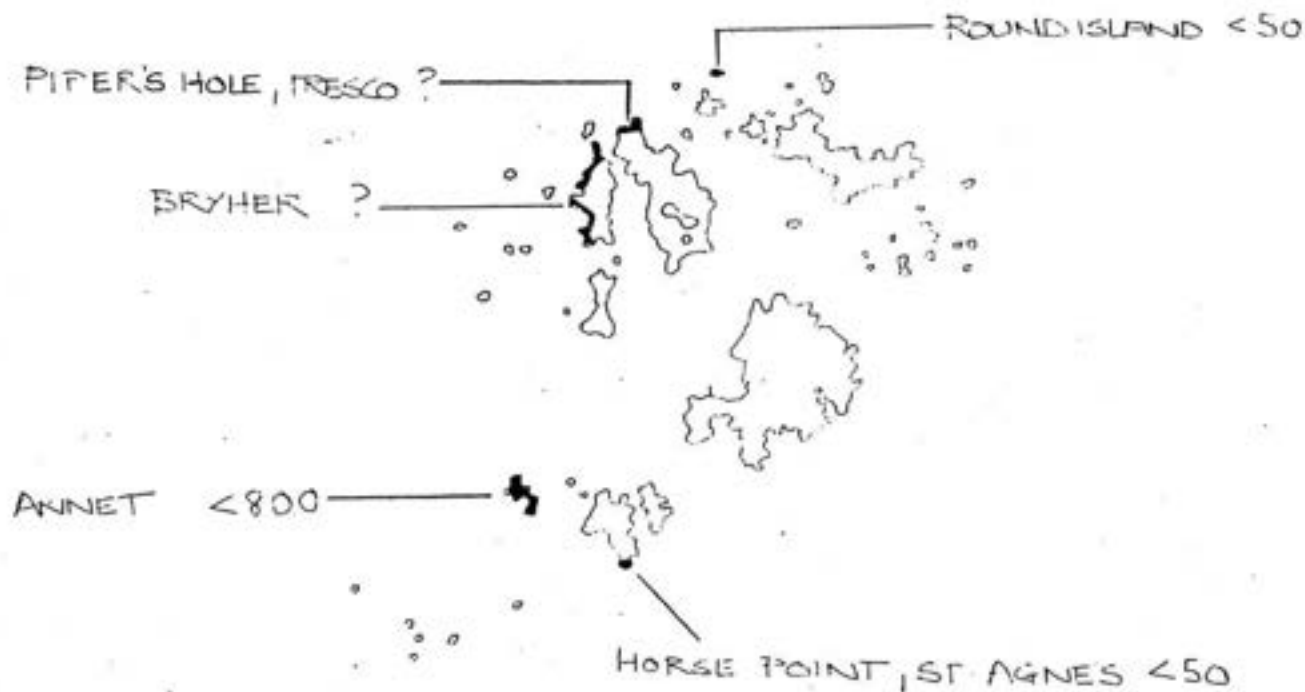
FULMAR: DISTRIBUTION OF 14 ESTIMATED BREEDING PAIRS

1974



MAP 1

MANY SHEARWATER: DISTRIBUTION OF c 900+ ESTIMATED BREEDING PAIRS 1974



MAP 2

in 1974 may not necessarily be typical, this also applies to damage to other species like Terns, Shags, Cormorants and especially Puffins. Without further information from successive breeding seasons, conclusions on predation are at present inevitably tentative. Counts of Shags and Cormorants are not essential in 1975, though it would be interesting to see in a future breeding season if the predicted rise in the Shag population has occurred; both species were studied by St Agnes Bird Observatory between 1960 and 1964. Estimates of the Puffin population would be valuable, but these are considered less important than previously as numbers appear to be stable. Counts must, however, be made within three years, and my subjective impressions of a decline in the meantime should be substantiated by detailed observations: accurate assessment of the population on Annet will inevitably involve many visits ashore throughout the breeding season. Both Kittiwakes and, though less so, Fulmars are easy birds to census, and counts can be made in 1975 during the normal course of Nature Conservancy work around the islands: with Kittiwakes, the colonies between Menavour and Daymark Head might be paid special attention, as population dynamics here are particularly interesting.

Details of gull management policies recommended for 1975 are given on pages 76-78 .

might be an adequate substitute in assessing population changes, if not actual threats to breeding performance.

In past years counts of Terns have always been partial and selective. Now that total population figures are available for one year, annual estimates of numbers would be most desirable, and these would probably fit in well with the national review of Common and Roseate Tern colonies. It is, I think, important that all of Scilly's scattered breeding stations should be located and counted, as estimates of the population on, say, Tresco alone would not take into account changes in concentrations within the islands.

Without doubt the most time consuming feature of census work in 1974 involved the Larus Gulls. To my mind, there would be little point in repeating counts in 1975, as actual increases in numbers would be absorbed within the 10% margin of error that underwrites all counts of breeding gulls. Significant changes in status would, however, be apparent in three year's time, when comprehensive coverage of the three species should be considered essential. Work on gulls on a national scale has grown increasingly important in recent years, and is likely to continue to be so in the future: surveys in Scilly should preferably be co-ordinated with wider censuses, and this may affect the timing of counts.

While counts at most sites will be unnecessary in 1975, the situation on Annet should be studied: counts of nests here present few problems, and results will be interesting as comparisons with figures and behaviour patterns observed in 1974. Great Blackbacks should also be counted on Menawethan, as this site combined with Annet will best reflect future population trends; the Lesser Blackbacked Gull colony on Samson should also be censused. Notes on the breeding successes of all three species in 1975 would be valuable in placing 1974 rates in the context of two successive seasons.

Because of their differences from most major areas for gulls, the Scillies offer particularly interesting conditions for studying their feeding ecology; research in 1974 is a preliminary to further work in this field in future breeding seasons. Without doubt the most valuable contribution to greater knowledge of the ecology of Larus gulls in Scilly would come from a programme of ringing, colour ringing and perhaps colour marking birds at breeding sites. Many features of Great Blackbacked gull behaviour, particularly the wintering areas of breeding adults following dispersal in September and October and the movements of immatures and prebreeders between their first winter and fourth summer, are little known, and ringing results would successfully fill in many of the gaps in present understanding. During the breeding season, individually marked birds, either carrying colour rings or marked with dye, would also make such subjects as loyalty to nest sites and feeding areas and the amount of interchange by breeding pairs between colonies directly assessable. My own knowledge of the requirements and disciplines such a scheme would involve is limited, but P Stanley of the Ministry of Agriculture and B H Bailey on St Agnes are well prepared to shape and undertake the programme. I would think that 1975 should see the start of this work, since 1974 results can then be used as background information before any significant changes in status occur. Studies of other seabird species in 1975 are less important, though all data would of course be useful. Estimates of Manx Shearwaters and Storm Petrels on Annet involve many problems, and would probably not repay the efforts needed if time and opportunities are limited. However, it is important that the scale of predation on these species in 1975 is assessed, as results and patterns observed

pollution at their wintering grounds, though virus infections and other possible causes cannot be ruled out.

The four species whose status has remained the same are Storm Petrel, Cormorant, Roseate Tern and Puffin. Considered comments on the first are not really possible because of the lack of accurate past information, but numbers of the other three species have remained within 10% of the 1967 figures, or, in the case of the Roseate Tern, around the average annual population over the last 10 years. The status of Cormorant and Puffin has remained unchanged despite identifiable threats to breeding success, and the fact that Puffins are maintaining their numbers following the enormous decline between 1920 and 1950 is particularly heartening.

RECOMMENDATIONS FOR FUTURE FIELD WORK AND STUDY

Much of the potential value of the work in 1974 will be wasted if repeat counts are not undertaken in future breeding seasons. The importance of the 1967 seabird census following the wreck of the Torrey Canyon has been demonstrated, in the historical notes on almost every species, and without these figures assessments of recent changes in status would have been vague and subjective. It is hoped that the 1974 results will provide a similar basis for comparisons for future surveys; ideally, the two years' work might be considered the corner stone of a long-term study of seabirds in Scilly.

Censusing is, however, a protracted and time consuming business, and weather, distances and the availability of boats will probably always mean that coverage is seldom as complete as observers would hope. Because total counts for all species are so difficult to achieve, I have outlined below what I consider to be the more important and rewarding fields for future studies, bearing in mind that time and opportunities may be less than in 1974.

Perhaps the most important single objective for work in 1975 would be an accurate survey of the Razorbill population in Scilly. Correct interpretations of numbers at colonies in terms of breeding pairs are difficult, counts should be repeated at least twice at all islands; landings will be essential on Gorregan, Mincarlo, Scilly Rock and especially Menavour, which is the least satisfactory island in Scilly to census from the water. It is also important that the counts should be made if possible between late May and early June, when errors from non-breeding or visiting birds are least likely. A total figure would be invaluable in assessing the extent of the species current decline. If this is impractical, counts, to be repeated in the following breeding seasons, should be made at Mincarlo and Menavour, as fluctuations in numbers at these two sites are most likely to reflect overall changes in status.

In my opinion it would be a good idea to ring Razorbills in Scilly from 1975 onwards. The value of recoveries as indications of real as opposed to postulated threats is well illustrated by the history of 2 of the very few Razorbills to be ringed in the islands (see pages 45-46), and the decline in numbers has been so steep that research into causes is essential. Disturbance to the birds from this work would be unlikely to affect breeding success adversely, and results, especially if adults could be colour ringed in any numbers, would provide useful checks on whether traditional nest sites continue to be occupied in future years. If ringing Razorbills is not considered a worthwhile venture, maps of nest locations at the major colonies

SUMMARY OF THE NUMBERS AND STATUS OF SEABIRDS IN SCILLY

The Isles of Scilly hold 14 species of regularly breeding seabirds, the widest variety to be found anywhere south of St Kilda off the Outer Hebrides. Only Skomer, the Farne Islands, the Blasket Isles and Rathlin Isle in Wales, England and Ireland approach the Scillies for the number of different breeding species, and the selection is greater at only seven sites in the United Kingdom, on St Kilda, Handa, Hay, Foula, Noss, Fetlar and Westray and Papa Westray.

At most of the colonies mentioned above the total numbers of breeding seabirds exceed 50,000 pairs, and at the more isolated northernmost islands are well in excess of 100,000 pairs. In contrast, the total seabird population in Scilly in 1974 was rather less than 11,200 pairs, of which nearly 60% were *Larus* Gulls. The islands hold only very small proportions of the national totals of most of the seabirds involved, and this is especially true of Fulmars, Manx Shearwaters, Cormorants, Herring Gulls, Kittiwakes, Terns and Auks. While numbers may therefore be minimal in the context of the country as a whole, this means that fluctuations in the breeding strengths of many species are readily notable, and declines, sudden or otherwise, may reduce certain birds to the point of local extinction. As discussed under the detailed notes on the species, reasons for and against successful and continued breeding vary according to the individual requirements of birds. However, it should be stressed that the Isles of Scilly lie on the southern extremity of many species' range, and so the impact of changes in distribution is likely to be more apparent here than at many other seabird colonies.

The results of the 1974 census show that 6 seabird species have increased in recent years, four have declined, and another four have shown no significant changes in status. Of the 6, Fulmar, Lesser Blackbacked, Herring, Great Black-backed Gull and Kittiwake have on average doubled their numbers in the last 30 years, the spectacular increments in Fulmars, Lesser Blackbacked Gulls and Kittiwakes balancing the slower rates of increase in Herring and Great Blackbacked Gull numbers in recent years; these expansions reflect national trends. In contrast, Shags have most probably grown more numerous in last few years because indiscriminate persecution has lessened. With the exception of the Fulmar, which still breeds in only very low numbers, all may be described as abundant breeding birds in suitable habitat.

The declining species are the Manx Shearwater, Common Tern, Razorbill and Guillemot. None are populous today as 30 years ago, and although the lack of historical documentation makes precise rates of declines unknown for any but the Razorbill, it seems likely that Shearwater, Tern and Guillemot populations have fallen consistently since around 1950. Local conditions have most probably adversely affected Manx Shearwaters, while dwindling numbers of returning Terns perhaps reflect a national decrease since 1930 as well as changes in local circumstances. Both larger Auks have declined considerably in South Western Britain over the same period, and the Scillies have been no exception. Guillemots undoubtedly suffered from the Torrey Canyon disaster in 1967, though numbers were most probably falling before and have certainly done so since: the present population level is so low that the future survival of the species in Scilly is not hopeful. Razorbills have declined by at least 40% since 1967, much the most dramatic fall of any seabird species in recent years. Reasons are most probably related to oil

summering birds noted in 1968, 1970 and 1973 were not reflected in this year's census.

Breeding strength at other sites remains generally stable, with the exception of the Eastern Isles which are discussed under adverse pressures. Increases in the populations on Rosevear and Menavour probably reflect the bird's erratic attachment to these islands, though at the latter overflow from the limited St Helens colony may have occurred. No Puffins were seen around Gorregan, but a singleton was off Illiswilgig in early May.

RESULTS OF 1976 SURVEY

The survey of Annet by Bailey in 1976 indicated not more than 25 pairs of Puffins, seeming to represent a large drop in population since 1974. Distribution was found to be as previously but without the larger colony on the North East Porth (Map 20). However, the total of 25 pairs maximum should be treated with some caution, given the problems inherent in censusing Puffins accurately and the relatively brief periods spent ashore in 1976. Occupied nest sites are difficult to locate before food deliveries begin in the second half of June, when most observations were made; furthermore, the areas where Puffins were apparently greatly reduced (North East Porth) or not recorded (Cairn Irish, Annet Head, along Smith Sound) were those found most time-consuming to survey in 1974. The 1976 figure is therefore very probably an underestimate of current breeding strength. If a decline of the order implied has indeed occurred, on the evidence of 1974's enquiry into predation on Annet exceptional mortality outside the breeding season would seem a more likely cause than adverse pressures at local level.

The impact of the 2 million gallons of crude oil from the schooner Thomas W Lawson wrecked in Scilly in 1907 is not known, but in 1908 the population on Annet was estimated to be 100,000 birds. Photographs of only a small fraction of the colony show them to be well distributed over the thrift at Annet Head, the ground riddled with burrows and dangerous to walk over; breeding was also concentrated on the eastern side of Annet, where the sandy banks was honeycombed by birds. At around this time Puffins also bred on Melledgen, Gorregan, Rosevear, Mincarlo and elsewhere, though in smaller numbers, perhaps hundreds rather than thousands; prior to the coming of the lighthouse - and the keepers' cats - in 1887, Round Island was described as 'thick with birds', overflowing onto nearby St Helens.

From about 1910 onwards Puffins began to decline in Scilly. One major contributing factor, predation by Great Blackbacked Gulls, was noted at the time, but the parts played by wider influences like climatic amelioration, increasing oil pollution and national changes in status are unknown. The fact that numbers decreased on Menavour until deserted in the late 1930s, a site never colonised by Great Blackbacks, does suggest that other pressures were operative. There are no records of predation before 1913, though C J King's comment in 1889 that on Rosevear 'gulls', including Great Blackbacks, 'hold the sway' does seem to imply it. By the first date a relatively large number of Great Blackbacks - around 30 pairs, perhaps - had established themselves on Annet, and these increased at around 13% per annum for the next 20 years. There can be little doubt that competition for breeding space between this expanding colony and neighbouring gulls and Puffins was considerable. Annet in 1924 was still a 'Puffin playground', with thousands offshore, but in the same year predation was also very high. A visitor recorded 'forty corpses within forty feet linear', and although he unfortunately did not mention whether these were found in Great Blackback or Puffin territories, it is clear that an easy and accessible food supply was heavily exploited. Over the next fifteen or so years this 'slaughter' was thought to have decimated the populations, both on Annet and other islands, for by 1938 only small numbers remained here, on Menavour and Mincarlo. Between 1945 and 1950 breeding was recorded regularly on Annet, Mincarlo and probably Castle Bryher, erratically on Gorregan and Menavour, and on Rosevear, Great Innisvouls and Menawethan since 1947, when coverage was more complete. Damage by Great Blackbacks was last commented on in 1946; the low population of c20 pairs of Puffins would have made further specialisation by individual gulls uneconomical, and there has been little evidence of predation on any scale since then. In the last 25 years they have bred regularly on most of the 1945-50 sites: and since 1960 on St Helens and in recent years on Scilly Rock. Information on numbers is lacking for most of these years, but the population on Annet has remained broadly similar over this time: counts of 95 offshore in early July 1951 and estimated maxima of 50 pairs in 1961 and 1962 perhaps indicate that a slight increase has occurred.

A full survey of the Puffin population was undertaken in 1967, and results are given on Map 13A. In contrast, the 1974 total of 87-91 breeding pairs might suggest that numbers have declined over the last 8 breeding seasons. However, the 1967 estimate for Annet of 50-100 pairs is too elastic to make any direct comparison of numbers meaningful, although the maximum number seen offshore in that year, 134, is markedly higher than 1974's 92 birds, most of the evidence points to a population of 50 to 60 pairs: the 1962 figure of c50 pairs is close to today's breeding strength, and it is unlikely that the population would have risen then fallen by 25% in 8 years. Numbers of non-breeding Puffins congregating around Annet vary annually: 'slight increases' of

on the birds, especially during the prospecting period at the start of the breeding season. One solution to this disturbance would be to place a line of buoys across the entrance to the bay at North East Porth: the inconvenience this would cause to local fishermen from St Agnes and, perhaps, to well-intentioned visitors are factors that would have to be considered.

Human disturbance at other sites is rare, partly because Annet's fame as the home of the Puffin has made the other breeding localities generally little known; landings on most of these islands are allowed only through permits and are sufficiently tricky to deter most would-be visitors. On St Helens, however, the situation is rather different. Although not visited more than once or twice a week during the 1974 breeding season, increased money and leisure time in the future may spell more human pressure on the island. Experiences on Annet suggest that Puffins will tolerate occasional visitors to breeding cliffs with no ill effects, but there can be no doubt that persistent picnickers on St Helens enjoying the view of Menavour during the summer months would have disastrous effects on this colony.

NEST SITE AVAILABILITY:

On the Cornish mainland, soil erosion from gulls' courtship displays has been cited as a limiting factor on Puffin numbers through undermining burrow systems. There is no evidence that this has been the case in Scilly, partly because the influences discussed above have confined Puffins to sites away from susceptible earthen slopes. Weather, particularly the gales of the 1973/4 winter, may have conditioned site selection through the rearrangement of storm beaches, etc, but this would be notable only on Annet and Rosevear.

In general, there is no shortage of suitable nesting habitat on the occupied islands in Scilly to accommodate a speculated increase in Puffin numbers in South West England over the years to come. On Annet, for example, there are a minimum of 90 suitable burrows along the main breeding colony, less than half of which are occupied at present: Mincarlo, once a breeding station for many hundreds of Auks, could obviously support much greater numbers. Only on St Helens is suitable habitat limited, and the 8 pairs occupy all available holes that afford some protection from rats: it is interesting that this colony is the same strength today as it was in 1967.

HISTORICAL SITUATION AND RECENT CHANGES IN STATUS:

As is well known, Puffins have been in Scilly since at least 500 AD, when archaeological evidence from Nor Nour, Eastern Isles, shows them to have been farmed in some numbers for food and oil. In pre-ornithological days Puffins were by modern standards extraordinarily abundant around the islands, probably nesting in many, many thousands. Evidence from the rentbooks of succeeding Kings suggests that numbers may have decreased between 1300 and 1440, when their monetary value as barter rose from one fifth of a penny to about one and a half pennies, though this economic trend may well reflect a mere declining taste for Puffin flesh amongst the stomachs at the court. Little information survives from the following generations, until the early years of the nineteenth century, when two visitors to the islands independently noted that the numbers and range of Puffins had diminished and it is reasonable to speculate that this decline must have been great to stand out amidst what was still a very high population.

Puffins were certainly very numerous at the end of the nineteenth century.

they have expanded their range to now spread over most of the southern half of Annet. While in my opinion it is unlikely that they will continue to increase at this rate, pressure from nesting density may well mean that the ground both along and above the cliffs at North East Porth - where in 1974 no other pairs were present within 25m of the Puffin colony - will be taken over by Great Blackbacks, with inhibiting results on breeding activity. Control measures to halt any future annexation of this area by Great Blackbacks are therefore recommended: these are discussed under that heading.

General pressures from gulls are largely absent at sites other than Annet and Rosevear; only on Menawethan have breeding gulls increased to any marked extent, and there are more important, unrelated pressures at this site. In the North Western group of islands gull populations have remained fairly stable over the last decade.

BROWN RATS:

On both Great Innisvouls and Menawethan in the Eastern Isles Puffins and Razorbills have decreased substantially over the last 8 years: in 1974 inconclusive behaviour by both species was noted, and the cause is considered to be Brown Rats Rattus norvegicus. Arguments in support of this theory are listed under Razorbill. Rats are also present at St Helens, where there is evidence that the observably high rodent population may have an adverse effect on the Puffin colony. Of the 8 pairs present, 4 nest in burrows midway up a 15-20m cliff whose base is riddled with rat holes: these pairs are clearly well protected from predatory attacks by the vertical climb from ground level. However, the other 4 pairs nest in burrows within 5 m of the base of the cliff, which is angled at this place by c70°. Rats use, if not breed in, burrows directly next to those used by Puffins, and on 23rd August the remains of a Puffin's egg was found on the rocks below. Unfortunately it was too old to assess for sure whether it had hatched, or whether it had been ejected by an adult bird, so its history is inconclusive. However, the discovery is curious in view of the presence of rats nearby, and these must be considered at least a potential threat at this site.

OIL:

No oiled Puffins were reported during the 1974 breeding season; nor was any seen on individuals' plumage.

HUMAN PRESSURES:

Puffins are, of course, immensely popular birds, having all the necessary features to capture the public's imagination, and trips to see them are a highlight of many people's holidays in Scilly. Visits to Annet are made daily during the summer months by the launches from St Mary's, and the Puffins usually pose obligingly within close range of the boats. All the boatmen display restraint by not disturbing the birds unduly, and few visits to their gathering grounds at North East Porth last more than 10 minutes.

More serious disturbance comes from private boats hired by visitors armed with enough time and ignorance to thoroughly interrupt any accessible social gathering: on 18th May, for example, a small boat from Tresco was seen to flush from the water a small group of Puffins at least 6 times, those on board clearly enjoying their own form of 'little game hunting'. This sort of behaviour is probably exceptional, and was witnessed at only one other time, but it could have a serious impact

Shearwaters comprehensive searches were not possible because corpses are washed in the sea before consumption and left to float away on the outgoing tide. However, very strong circumstantial evidence was discovered for at least 2 incidents. On 18th July a Great Blackback was watched from a boat skinning a corpse on the rocks under the main Puffin colony at North East Porth: the angle of view and the shape of the rocks made positive identification very difficult, but the species involved was clearly this or Manx Shearwater. Since Great Blackbacks usually kill and eat Shearwaters during the early hours of the morning, and this sighting occurred at about 2030 hours, it seems reasonable to assume that the prey was a Puffin that had been killed during the evening gathering on the same day. The rocks were searched on 23rd July, but there were no remains. A second probable case of predation was found on 23rd August, part of the mantle of a Puffin positioned on the same outcrop of rock and clearly involving the same pair of Great Blackbacks - identification of the body will be confirmed at a later date.

The history of these incidents illustrates some of the difficulties experienced in assessing predation and practical means of identifying known destructive Great Blackbacks. In this case, the damage clearly involved 1 of the 2 pairs of gulls nesting along the main Puffin cliff: between mid June and late August this pair accounted for 2 Manx Shearwaters and 1 Storm Petrel, while the second pair had at least 1 adult Shag and 2 Storm Petrels. These birds clearly constitute a real threat to other breeding seabirds in the area, and given the above information and the relationship in distribution discussed below, it is recommended that control measures are taken against them during the 1975 breeding season - a map of their location is given under Predation. The form these might take, and other measures against Great Blackbacks that stem in part from their presence near other Puffins on Annet, are detailed under Predation, and Control Measures, page 72-73 and 76-78.

GENERAL PRESSURES FROM GULLS:

The enormous increase in breeding Great Blackbacks on Annet over the last 60 years has clearly influenced the distribution of the Puffin on the island. As mentioned under Historical Situation, below, prior to 1913 the main colony of Puffins was on the gentle thrift-covered slopes of the Northern half of the island. Since at the latest 1945 this area has been abandoned, and has been dominated for many years now by Great Blackbacks, which today number 230+ pairs over the Northern and Western slopes. Present Puffin nest sites are confined exclusively to cliff burrows (43 pairs), rock crevices (7 pairs) and storm beaches (3 pairs) adjacent to the sea which allow the shortest, most direct entrance/exit for the birds. Research into nest site selection in the presence of gull interference has indicated that such sites yield a higher average breeding success than from more vulnerable nests on level ground. Puffins on Annet may therefore be said to have adapted well to changes in status around them, and at present frequent optimum nesting habitats.

There is, however, strong evidence that this balance may be disturbed in the near future. Analysis of the 1974 distributions of Puffins and Great Blackbacks shows that the main strength - c70% - of Puffins, between Annet Head and North East Porth, is situated along the only stretch of suitable coastline relatively unpopulated by Great Blackbacks - 2 pairs of the latter along c250m of shore, against the island average of 1 pair every c15m: see Map 18A. Great Blackback numbers on the island have grown by 45% over the last 10 years, and

much the most important breeding station in Scilly: the records reflect an inevitable bias towards this site. However, landings were made at all other Puffin islands other than Castle Bryher and Menavour, and searches made for evidence of disturbance. The colony on St Helens was visited more often than elsewhere, with the exception of Annet. Wider factors influencing Puffin numbers on a national scale like climatic changes, marine pollutants, or unrelated alterations in national distribution were outside the scope of this survey, and their relevance to the population in Scilly is not discussed in detail. In general, interference from gulls was extremely rare, and this conforms with the subjective impressions of dispassionate observers with many years' experience of seabirds in Scilly. The incidents summarised and discussed below are therefore exceptional rather than normal: the importance placed upon them is due to the precarious status of the Puffin today, despite, or rather in spite of, their history outlined under the following heading.

KLEPTOPARASITISM:

On Annet, Puffins share their main breeding cliffs with around 25 pairs of Herring Gulls, which nest either directly in front or a few metres below burrow entrances. Fears have been expressed in the past that these birds may interfere and exploit chick provisioning by adult Puffins, although only one case of patently aggressive behaviour by Herring Gulls has been recorded in recent years. Watches of six hours duration were made at peak food delivery times - 0600-1200 hrs - on three mornings in late June and early July, involving 100+ fish loads: in addition, less intensive but still regular observations were made daily on 17 dates ashore on Annet. No incident of Kleptoparasitism was witnessed at any time. All observations led to the conclusion that the Puffins are largely oblivious to the presence of the gulls, and vice versa: apart from a single half-hearted 'stoop' by one Herring Gull on a loafing Puffin, the only signs of mutual recognition occurred when Puffins set on a collision course would suddenly swerve out of the way of passing gulls. In normal circumstances they showed no wariness. The absence of any potential threats from this type of gull interference is confirmed by the behaviour of the Puffins during the post-incubation period: in contrast to the early part of the season, birds would often fly over land with loads of fish, crossing gulleries in the process: in one case, an individual returning from feeding was seen to fly directly over the waist of the island from the South Bay. Such behaviour would, I think, be most unlikely if Kleptoparasitism took place on a significant scale.

PREDATION:

1 predated corpse, of an adult probably killed between early May and early June, was found on Rosevear on 18th June. The body was situated amongst the boulders over the Puffins' nesting area, and was presumably killed by a Great Blackback nesting in the immediate vicinity. Breeding conditions on Rosevear are very congested, with 155 pairs of Great Blackbacks spread over c2.5 acres of suitable nesting territory, and the relatively high number of Shag corpses found here is probably a reflection of this density - see Predation, page 64. Predation on Puffins at this site is clearly of a similar nature. It is significant that throughout the rest of the breeding season only 7 Puffins were present at Rosevear, and so this single corpse implies a reduction of 25% in the breeding strength. Control measures are not practical at this site, for reasons given under that heading, page 73.

On Annet, no conclusive evidence of predation was found. As with Menx

PUFFIN FRATERCULA ARCTICACENSUS RESULTS

87-91 breeding pairs. Map 13.

CENSUS METHODS:

All known Puffin breeding sites were visited at least twice between mid May and mid July, and the total above is based on counts of birds present during the incubation and post-incubation periods. Much longer time was needed to locate the 53-57 pairs on Annet, where counts from boats proved very misleading. All figures refer to apparently breeding pairs, but on Menawethan no breeding behaviour was observed with 1 or 2 summering pairs, and on Annet 4 probable pairs were present but not conclusively proven. Because of the lack of definite evidence to the contrary, these pairs have been included in the total of the breeding population for the islands. Results are considered a precise estimate of current breeding strength.

BREEDING SUCCESS:

A single fledged chick was reported from the Western Rocks on the rather early date of 14th July. During two visits to Annet and two nights ashore in late July and early August no chicks were seen, but this should not be taken as evidence of a poor breeding season, rather of the elusive behaviour of the young. Numbers of adults present at Annet and Mincarlo in the first week of August - 83% of the population at the latter site - show that post-breeding departure, and presumably hatching/fledging times, are well synchronised among the population as a whole.

NEST SITE SELECTION

Puffins in Scilly choose two main breeding habitats. On Menavour, Mincarlo, Castle Bryher, Scilly Rock, Rosevear and Menewethan eggs are laid in well protected rock clefts and gullies, in the manner of Razorbills. Pairs adapt to the specific topography of each island: on Rosevear, for example, they breed under the main storm beach as crevice sites like those on Mincarlo are largely absent. 3 pairs on Annet also nested in the storm beach at the southern end of the island, but here the bulk of the population - 83% - occupy burrows on the low cliffs on the eastern side of Annet Head see Map 14. Burrows in similar but rather higher cliffs are used by the community on St Helens.

ADVERSE PRESSURES OBSERVED IN 1974

Special study was made in 1974 to assess adverse pressures on the Puffins in Scilly, especially in the form of interactions with gull species. Predation by an increasing population of Great Black-backed Gulls undoubtedly contributed to, if not actually caused, an immense decline in Puffin numbers on Annet in the 1920s and 1930s, and it was felt that information on the present situation in the light of the very different ratio between the two species was needed. For a number of years both informed and less informed opinions in Scilly have advocated extensive control measures against the Great Blackback, and damage to Puffins has usually been given as the main justification for the course of action.

Assessment of pressures was concentrated on the situation at Annet,

the present century, for in 1946 numbers on Menavour and Gorregan were said to be 'too large to estimate', and Mincarolo and Hanjague were occupied. Unfortunately, different - and perhaps more sober - observers thought them again 'very scarce', and although breeding may have been more diffuse than previously, comments on status during the 1930s support the impression of a gradually declining species. Few counts were made during the dozen or so years after 1950, and so no final date is known for Mincarolo, deserted during this time.

The 1967 census showed 50+ pairs at the three islands occupied today - numbers are given on Map 12A. Pollution from the Torrey Canyon was thought to have reduced numbers in general, and in particular on Gorregan, where the 17 breeding pairs in 1967 amounted to only 34% of the 1962 breeding strength: this was largely confirmed when two ringed adults from the island, representing half the ringing total for Scilly, were found dead from oil on St Mary's and the Cornish mainland.

While the Torrey Canyon undoubtedly had a major impact on the Guillemot population, the situation is complicated by records over the previous three years. In the St Agnes Bird Observatory Report for 1965/4 the Gorregan community is stated as between 15 to 20 pairs, very similar to the 1967 total, and Guillemots numbers on Scilly Rock was considered much reduced in 1965. So it may be that the population was decreasing irrespective of the main hazards of April 1967.

Observers reported 'marked increases' at Menavour in 1969 and 1970, and on the evidence of the 1974 breeding season numbers have remained fairly stable at this site; on Scilly Rock they have dropped a little, but only by a margin within possible censusing errors at this seldom-visited stack. A distinct decline has taken place on Gorregan.

GUILLEMOT URIA AALGECENSUS RESULTS:

34-38 estimated breeding pairs. Map 12.

CENSUS METHODS:

The three Guillemot breeding stations were visited at least twice, and counts made of birds present, with special reference to individuals entering or leaving apparently occupied nesting sites. Some of the problems experienced in censusing Razorbills were also present in work on Guillemots, but in general the relationship between 'off-duty' birds and breeding numbers was found to be more explicit. As with the Razorbill, numbers on Menavour were estimated rather than counted.

In addition to the breeding pairs mapped, non-breeding Guillemots, maximum 3, were twice seen between Menawethan and Great Innisvouls; occasional birds seen to the North of St Martins presumably originated at Menavour.

BREEDING SUCCESS:

No young were seen around Gorregan and Scilly Rock on visits in late June and early July. However, post breeding dispersal was both quicker and earlier than with Razorbills, and so these negative reports do not necessarily indicate negative breeding success. Small numbers - <10 - of family groups were seen around Menavour in late June and the first days of July.

ADVERSE PRESSURES OBSERVED IN 1974:

As with Razorbills, few adverse pressures on Guillemots were noted. Bad weather may affect breeding success, and the more exposed choice of nest site may also lead to greater interference by gulls. Two factors, however, suggest that this second potential threat has probably diminished in recent years. While prior to 1967 a few pairs of Guillemots nested annually on a suitable ledge on Gorregan, the majority of pairs today lay their eggs in similar situations to those used by Razorbills, having presumably taken over protected sites vacated during the decline in Auk numbers since 1967 and 1968. Gull populations at the three Guillemot breeding stations are much lower than on most neighbouring islands, and only on Gorregan are breeding Great Blackbacks present; a thorough search of North Cuckoo, Scilly Rock in late June produced no evidence of predation.

HISTORICAL SITUATION AND RECENT CHANGES IN STATUS:

Guillemots have always been rather scarcer than Razorbills in Scilly, an inversion of their status over the country as a whole. No historical evidence is available before the middle of the last century, when they apparently bred 'in great profusion' on Gorregan, Rosevean, Mincarlo, Scilly Rock, Menavour and Hanjague. By 1885-6 breeding was confined to the last three sites, with not more than 30 pairs at each, and in 1911 they were described as 'very scarce', the decline being attributed to gull predation.

Rather surprisingly in view of both local and national trends with related species, there might appear to be strong circumstantial evidence of an increase in numbers and an extension in range during much of

RESULTS OF 1976 SURVEY

Bailey's figure for this species on Annet was 6 pairs, a drop of 2 pairs from the 1974 total, with some redistribution.

The provisos concerning Puffin censuses also applied to Razorbills. The redistribution accords with their past history on Annet, and is probably a regular feature of the island's population.

that factors influencing survival differ in Scilly according to the size of the colony. One explanation may be that birds from well populated stations tend to winter together, and so are more susceptible en masse to pollution and associated dangers; less likely but possible is diminution due to virus diseases, whose impact would be heavier at rather more crowded sites.

More clearcut reasons may be put forward for the declines on Greet Innisvouls and Menawethan in the Eastern Isles, where numbers have dropped by c80%. Both islands support large numbers of Brown Rats Rattus norvegicus which are totally absent at the seabird colonies in the South and North Western groups of islands. Damage to Auk species has been recorded at a number of places in Western Britain, and in the case of the Puffin colony on Lundy, Devon, has been wholesale. It is not known whether the Brown Rat is increasing on the two islands, but it is significant that the only other potentially vulnerable seabirds here, Shags and Fulmars, are both much better equipped to ward off egg and chick stealing by rodents, and their numbers have been maintained and are probably increasing. Pressure from Brown Rats may also explain the inconclusive behaviour by Razorbills at Menawethan described under Census Methods pointing to major inhibitions on normal breeding activity.

The discovery of two new Razorbill nesting sites, on Gweal and Ragged Island, reflects increased coverage in 1974 of non 'Auk islands' rather than any change in distribution.

the likelihood of this form of interference. In the past fears have been expressed that bad weather may cause chick mortality at poorly situated nest sites: heavy rain in late June and the first half of July may have had this effect, but no waterlogged chicks or premature broken eggshells were found. No oiled birds were reported between April and September 1974.

Despite this lack of discernible threats to the Razorbills' status, a major decline has happened in the last eight years. This is discussed in the following paragraphs, and speculative as opposed to observed reasons are given.

HISTORICAL SITUATION AND RECENT CHANGES IN STATUS:

Razorbills have never attracted the attention that has been showered, albeit intermittently, on the Puffins in Scilly, and their position before this century is locked in obscurity. The Romano-British on the Eastern Isles farmed more Razorbills than any other seabird, a fair indication of their relative abundance, but subsequent details are completely lacking until Smart wrote of 'countless numbers' at the sites occupied today at the end of the nineteenth century. Number were maintained up to at least 1914 and although a decline may have occurred they were 'abundant' in 1946. There are no further estimates numerical or otherwise, for the next twenty years, although the population in 1960 may be deduced as about 400 pairs.

Following the wrecking of the Torrey Canyon in April 1967 a full survey of Auk numbers was undertaken that June, and figures and distribution are shown on Map 11A. Comparison with the 1974 census reveals a decline of at least 40% with the main colonies on Menavour and Mincarlo reduced by as much as 60-70%. There is some evidence that the Razorbill population fluctuates from year to year - they were very scarce in May, 1961, for example - but the 1974 totals confirm a downward trend noted from 1969 onwards. Subjective impressions of local observers suggest that the numbers present in 1970 and 1971 may have been even lower than today, indicating a very dramatic fall in the course of two breeding seasons after 1968.

Reasons for the decline probably stem from the threats common to most seabirds, and particularly to diving species like the Auk family. Although Razorbills in Scilly were thought to have been only marginally affected by pollution from the Torrey Canyon, it may well be that numbers were reduced in a way that could not have been discerned immediately: for example, few young Razorbills were ringed by St Agnes Bird Observatory, and considerable mortality may have taken place among unmarked prebreeding birds in their second to fourth years, thus creating a lack of replacement breeders to cover adult mortality from 1968 onwards. Oil pollution is, of course, heavier in the South Western seas of Britain than many other places, which means that Auks from Scilly are particularly vulnerable at their wintering grounds: it is significant that two adult Razorbills, ringed in Scilly in 1963 and 1965, were killed in an oiling incident off South Devon in February 1968.

A curious feature of the Razorbill's decline has been its localised impact within the islands: decreases have been considerable at the major colonies, but at the lesser sites of Rosevear, Annet, Gorregan and Melledgen the populations are within 83% of the 1967 position. The absence of any noticeable increase in the pressures on islands like Mincarlo, Scilly Rock and Menavour, and indeed the definite drop in the number of landings, legal and otherwise, at these sites, suggest

RAZORBILL ALCA TORDACENSUS RESULTS:

131-137 breeding pairs. Map 11.

CENSUS METHODS:

All known breeding sites were visited between early May and late June, with the exception of Maiden Bower, where no Auks have been reported in recent years. Most colonies were counted at least twice, but second visits were not possible at Castle Bryher and Illiswilgig. Attempts to census Menavour, the main breeding station for the species, were persistently hampered by high seas, and the breeding population here has been estimated rather than counted. Although the total for the island is low, it is based on impressions gained on weekly visits throughout the breeding season by observers with many years' experience of the colony, and so may be considered a fair reflection of the breeding strength.

A comprehensive survey of Auk populations is also subject to the often obscure relationship between the number of birds present at a site at any one time and the actual number of breeding pairs. At most stations repeat counts tallied sufficiently well to allow specific figures to be acceptable, but assessments proved difficult at Gorregan and Menawetha. Experiences at the last site illustrate some of the problems involved. On four visits, including three landings, between late April and early July, no Razorbills were seen to show any attachment to the island, although 2 birds were once seen resting on a nearby rock; on all visits, however, small parties of up to 13 birds were present on the surrounding waters, but never within 500m of the shore. Then, in mid July, when most of any breeders would have departed, a single bird was noted delivering fish - consequently, the population of the island is stated as 1+ breeding pairs, as the absence of any coherent pattern in the above observations would make any higher figure merely speculation.

For the reasons given above the 1974 total cannot be taken as a wholly accurate picture of the Razorbill's status; it is almost certainly an underestimate, perhaps by as much as 30%. However, in my opinion the current breeding population is less than 200 pairs.

BREEDING SUCCESS:

Assessment of breeding success was governed by the same factors as census work, and complicated by a wide variation in fledging dates. Little information was therefore available, but smaller numbers - < 15 - of family parties were seen from July onwards, and 2 accessible pairs on Annet were successful.

ADVERSE PRESSURES OBSERVED IN 1974:

Few threats to Razorbills were noted during the breeding season. No predated corpses or chick remains were found, and the usual nesting habitat, in well protected gullies and rock crevices, renders eggs and young almost immune from what would be, at most, occasional and desultory attacks from Great Blackbacks. On Annet, Kleptoparasitism by Gulls was not observed during 50+ food deliveries to young, and so may be assumed to happen very exceptionally; the smaller number of Gulls at more important Razorbill breeding stations further diminishes

ARCTIC TERN STERNA PARADISEA:

A close watch was kept during the breeding for odd pairs of Arctic Terns amongst Common Terns in the colonies. Although the Scillies lie well to the South of its breeding range in Northern Europe, Arctic Terns have bred in small numbers in past years. Records from the nineteenth century state that in the 1850s' Arctics were more numerous than Common Terns, but in view of the lack of reliable criteria for separating the species at the time notes of status prior to 1950 must be regarded with some scepticism. More satisfactory records concern a few pairs in 1948, c12 probable pairs in 1963 and odd birds in 1965: 40-60 breeding pairs on Annet in 1964 strikes one as barely credible, but the report came through St Agnes Bird Observatory and so must be acceptable. Analysis of numbers in relation to Common Tern strength shows that Arctics tend to be present in years when the latter are particularly numerous, and in 1973 2 almost certain pairs were with the 100+ pairs of Common at the South end of Tresco. None were seen during the 1974 breeding season, when of course Common Terns returned in smaller numbers than in other years.

SANDWICH TERN STERNA SANDVICENSIS:

A single bird was present around Scilly, throughout June, during which time it was watched displaying on two dates over the terneries on Annet and Tresco. Breeding was last proved in 1852 - records from the 1930s and 40s cannot be considered reliable as identification was often based on eggs found, which in the Common Tern vary immensely but sporadic nesting might well occur in the future, especially if the nesting area at the South end of Tresco is better protected. Breeding at many colonies in Britain is erratic and birds take readily to suitable new habitats: observations in 1974 may mark the start of an increasing movement by the species to sites in the South West.

the major concentrations of their relatives - Green Island and Arnet were regularly favoured when Tern numbers were higher at these sites.

In most respects, therefore, the status and distribution of Roseate Terns in 1974 conforms with their history over the last 25 years.

ROSEATE TERNSTERNA DOUGALLIICENSUS RESULTS:

4 pairs bred in the ternery at the South end of Tresco; 1 pair bred on Castle Down, Tresco. In addition, 2 non-breeding pairs summered on Tresco, and were also seen at times on Samson.

CENSUS METHODS:

Pairs were located during census work on Common Tern numbers at the above sites.

BREEDING SUCCESS:

The average clutch size on Tresco on 16th June was 1.75 eggs per nest. All 5 pairs reared single young to the flying stage, and thus enjoyed a much better breeding season than Common Terns.

ADVERSE PRESSURES OBSERVED IN 1974:

These were broadly similar to those affecting Common Tern breeding success, as species nesting in compact colonies are obviously subject to the same external pressures and influences. However, the higher breeding success enjoyed by the Roseates on Tresco does suggest some kind of resistance to the threats which undoubtedly reduced the Common Terns to an indifferent season in 1974. Three explanations may be relevant here. Firstly, analysis of breeding success indicates that predation of chicks by gulls could not have occurred on any notable scale, and it is possible that the Roseates' habit of leading their young away from the nesting area down to the shoreline at an earlier stage than Common Terns gave them greater protection from marauding gulls. Secondly, nests were all situated on the highest ground available in the ternery at the south end of Tresco, and in 3 out of 4 cases close to the shelter of bramble brakes, site selection may have added to defence against gulls and made the impact of heavy rain in early July less severe than at sites on lower ground. Thirdly, Roseates on breeding territory are more immediately aggressive than Common Terns, prone to rise quicker and settle later in the face of disturbance: this trait may give them greater security from gulls, and it is interesting that all nests were within 20m of the public path alongside the colony.

HISTORICAL SITUATION AND RECENT CHANGES IN STATUS

Breeding was first discovered in 1840, when a visitor found them to be 'tolerably common' and 'obtained as many eggs as he required'. The next record, from 1854, states 'only a few pairs', a neat irony! - and Roseates last bred in 1867, following which they were absent for half a century. Roseate Terns are such distinctive birds that the likelihood of misidentification and oversights which make some records of scarcer terns in Scilly rather dubious is slight, and their return as a breeding species in the 1940s coincides with increasing numbers over the country as a whole.

Since the early 1950s the islands' population has averaged between 4 and 8 pairs, though in exceptional years such as 1959 and 1967 up to 15 pairs have been present: larger numbers usually occur when Common Terns are particularly abundant, but as in 1974 breeding success can be good in poor years for Commons. Nesting is always confined to

RESULTS OF 1976 SURVEY

No terns were found to be breeding on Annet in 1976 and in fact only one bird was noted throughout the entire period of visits.

The demise of the traditional Common Tern colony on Annet during the last ten years is probably directly associated with the concomitant increase and spread of Great Black-backed Gulls over the island, although wider changes in the breeding distribution of Terns in Scilly during this time suggest that other factors might also be responsible. It is doubtful whether the absence of Terns on Annet has resulted in any overall reduction in the population in Scilly, since considerable interchange probably occurs annually between individual colonies. In 1974 it was found that the average breeding output varied greatly at different sites, the main limiting factors being inclement weather and predation of eggs, young and occasionally - adults by gulls, often resulting from human disturbance. For these reasons gull-control measures might encourage re-colonisation of Annet. This could be beneficial to the Tern population as a whole, since following an effective elimination programme adverse pressures - except poor weather - might be negligible, perhaps creating optimal conditions for successful nesting.

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Tresco Channel is similar to Castle Down, and with identical vegetational cover it may well be that numbers in future years will increase from the two pairs present in 1974. The second potential nesting site is Top Rock Hill on St Martins, overlooking White Islands. Terns bred here in some numbers - c25 pairs - until a fire in the 1950s dispersed the population to Tean and Daymark Head, and although it has never been recolonised, the area is now, to human eyes, suitable and gull and human interference limited in comparison with other spots on the island. I feel a close watch for Terns should be kept at this locality in forthcoming years.

Since 1970 Tean has been closed to visitors during the breeding season to afford protection to Ringed Plovers and Terns. While both species have undoubtedly benefitted from the lack of human disturbance and the small numbers of each appear to be maintained, there is a sense in which this policy is a little out of step with regards to recent changes in the distribution of Common Terns - see below. The days when uninhabited islands were the premier nesting sites for the species to have passed, and rather more interesting are the signs of adoption displayed by the pairs in 1974 on St Mary's and St Agnes. On St Mary's, where breeding was first reported in 1969, 2 pairs raised 4 young to the flying stage with 30m of the Airport, despite considerable noise, and with 1 pair, hourly disturbance from dumper trucks from late June onwards. People walking along the coastal path from Old Town to Porth Hellick were regularly 'quartered' by the parent birds, but for obvious reasons few visitors wandered up to the margins of the airfield itself. There were, of course, no resident gulls nesting anywhere near the nesting area, and the high success rate may be explained largely by their absence. Common Terns at this site therefore demonstrated that exposure to what would seem unnatural conditions had little impact when more serious threats were lacking, and an interesting example of adaptation in feeding habitats was seen on two occasions in July; birds deliberately picking up offal, mostly used bait and guts from ray and mackerel, from a fishing boat in Porth Hellick in the manner of accompanying Herring and Great Blackback Gulls. It will be interesting to see if numbers increase here in the future.

On St Agnes the situation was rather less clearcut: the 3 pairs did not take up territory until mid June, much later than breeders at other sites, and 1 pair laid an exceptional clutch of 5 eggs, signs that these were displaced birds from elsewhere in Scilly. However, the site selected was well isolated from gull interference and the wet and blustery weather in early July made little difference to breeding progress, so as on St Marys adaptation to less usual circumstances can be said to have been successful.

HISTORICAL SITUATION AND RECENT CHANGES IN STATUS:

The first record of Common Terns in Scilly was in 1840, when birds were present in May at the southern end of Annet. As with so many other species, one must assume that breeding was regular long before the fact was first noted for posterity. In 1850 numbers on Annet seemed to be high, birds 'all over the higher ground of the island', but by 1860 they had apparently declined and were outnumbered at that time by Arctic Terns. From then until 1945 their history is obscure, but in 1923 H M Wallis wrote that 'Terns, once very abundant, are now scarce'. The difficulty in interpreting early records is that tern numbers in Scilly have always fluctuated from year to year, and so counts in any given year seldom provide an adequate basis for comparison with recent trends.

GULL INTERFERENCE AND PREDATION:

At all nesting sites disturbance from passing gulls was witnessed, and on Annet, Samson, St Helens and Tean colonies were close to breeding concentrations of gulls. The terns on Annet in particular suffered intensive interference from Lesser Blackback and Great Blackback Gulls nesting within 25m: passing birds were inevitably seen off in no uncertain fashion, special attention being reserved for Great Blackbacks. Disturbance was highest from 1700 hrs onwards, when recently returned gulls would wander over the island: in early June it was calculated that the terns were occupied in mobbing activities for each evening for at least 10 minutes in every hour.

On Annet the general impression was that interference from Gulls was seriously hampering breeding progress: this was considered unlikely at other colonies, though similar effects may have been felt by the colony at the south side of Tresco, where the resident flock of non-breeding Gulls would cross the nesting area on the way to and from the Abbey Pool.

Direct predation on eggs, young and adult birds was found at these two sites. On Annet, a Great Blackback robbed at least 1 egg in early June, and the wing of an adult was found by its nest on 13th June. It is significant that both cases involved the nearest Great Blackback to the breeding area, and while corpses would have been discovered if predation of adults had happened at other times, eggs might well have been taken on a regular basis - observations on Great Blackback predation of Herring Gull chicks suggested that once an accessible food supply had been tried and found rewarding: it was regularly exploited. By late June it was clear that the 7 pairs of Common Terns were unlikely to have much success, and only 2 unattached birds were in the area on 9th July: the nesting area was inspected and a few broken but unhatched egg remains found. Gull pressure with some predation were undoubtedly the major causes of desertion, and control measures are recommended to reduce the number of Great Blackbacks along the shoreline of the southern end of Annet - Reasons and methods are discussed in greater detail on pages 72-73 and 76-78.

Predation on Tresco occurred between 8th-12th July, when at least 4 chicks were taken by Herring Gulls, part of a non-breeding flock of between 60 and 80 birds resident in the vicinity. In 3 out of the 4 incidents disturbance by people was exploited by the Herring Gulls and chicks taken while parent birds were agitated by passerbys on the footpath. Predation was likely to have been much greater, for the examples above were seen in only 5 hours' observations the form taken supports the need to close the path along the south side of the ternery.

No evidence of gull predation was found at other sites, although it most probably did occur. It is significant that at the two colonies not threatened by gull disturbance, on St Mary's and St Agnes, the success rate was 1.8 young per pair in comparison with 0.3 elsewhere.

WEATHER:

In past seasons poor weather has been known to affect breeding success, especially through heavy rain when the chicks are hatching. In 1974, conditions were generally good in May and June, though heavy rain on

Typical cliff ledge sites are limited in Scilly to the traditional stations at Gorregan and Menavour, and since 1959 overcrowding has initiated an extension of the Kittiwakes' range to include low earthen cliff habitat. There is no evidence that lack of the more usual nesting areas has in any way inhibited the increase of the species, for in the last 15 years they have spread from St Helens to Whit Island and Daymark Head St Martins, and today these low bays and caves account for nearly 40% of the population. None bred this year on Annet Head, which was deserted in the middle of the 1973 breeding season. The site appears - to human eyes - eminently suitable, and the birds erratic behaviour was presumably in some way related to the dynamics of a rapidly increasing community - see below.

HISTORICAL SITUATION AND RECENT CHANGES IN STATUS

Like the Roseate Tern, Kittiwakes forsook the Scillies in the late nineteenth century only to return after an absence of some 40 years. Between 1850 and 1870 they bred on Menavour and Gorregan in much the same strength as today - at least 100 pairs were at the latter site in c1860. The next three decades saw a heavy decline: Menavour was abandoned by the 1880s, and breeding was last recorded on Gorregan in 1900. Human exploitation of the Kittiwake as sport and for its feathers and flesh is considered to have been the main cause of a natural decline at this time. Similar activities probably reduced their numbers in Scilly, though it's hard to think of a less 'sporting' bird than the Kittiwake - surely the frisson of shooting such a confiding target would turn to boredom in a matter of minutes.

Kittiwakes returned to nest in 1938, when 6 pairs were found on Menavour, where they had been summering if not breeding for several years previously. Occupation was sporadic until 1945, when 20 to 30 pairs nested on Gorregan and about half that number on Menavour. Although none were present at the latter site in the following year, the total population for the islands remained stable until c1950. From then on numbers and distribution expanded enormously: Menavour was censused in 1958, and 258 nests were found, reflecting such a high rate of increase that immigration from other colonies must have taken place: numbers on Gorregan in that year were significantly rather lower than in 1952, when 50 to 60 pairs were breeding. Congested conditions on Menavour led to the colonisation of nearby St Helens in 1959, and in that year the total population for the islands was reckoned to be around 260 pairs, perhaps a slight underestimate.

Since 1959 the pattern described by this increase has been one of large expansions at occupied sites followed by dispersals and colonisations of new areas. Between 1960 and 1965 the St Helens colony increased by 400% until shortages of additional nest sites grew critical and a few overflow pairs settled on Daymark Head St Martins in 1966. Numbers on St Helens are low today, while the new colony has increased considerably, and it is clear that the integration between these two sites mirrors that between Menavour and St Helens in the late 50s. A similar history can be traced in the South Western group of islands: while numbers on Gorregan have increased only marginally in the last seven years, new colonies have sprung up on Annet and Rosevear, again involving overflow young.

Kittiwakes were censused in 1967 and 360+ pairs estimated - see Map 9A. Since then they have increased by about 10% per annum to reach the 1974 total of c500 pairs. Both the general increase and the extension of range are likely to continue in the future and I would think that a new breeding site will be occupied within the next three years.

RESULTS OF 1976 SURVEY

Two pairs bred on Annet on ledges occupied some years previously.

Re-colonisation by Kittiwakes is expected, since they are increasing in Scilly and the reasons for deserting Annet in 1973 were never clear.

In 1969 the Great Blackbacked Gull population in Scilly was stated to be around 1200 pairs, a much more satisfactory figure than previous estimates. The 1974 total of about 1583 pairs therefore indicates that an increase of about 31% has occurred in the last 5 years, implying annual increments since 1969 of about 6.3%. This of course is a much lower rate of increase than that prevalent during most of this century, and might in fact be lower still, as the 1969 census did not involve accurate counts of the more northern outposts of the species.

Estimates of individual colonies made for the 1969 result have unfortunately not been forthcoming, and so a composite picture of counts from major sites in 1964 and 1967 have been used as the basis for population comparisons with today: figures are given on Map 7A. Analysis of the records illustrates one of the major factors limiting population expansion, discussed under 'Adverse Pressures observed in 1974', the effect of restricted unoccupied breeding space: numbers on three of the Nor'rand Rocks, Illiswilgig, Mincarlo and Castle Bryher have increased by just over 30% in the last 10 years, about half the average rate of increase for the islands as a whole. Similar patterns may be noted on other small breeding sites like White Island, Ragged Island, Rosevear and Little Innisvoul. In contrast, numbers on Annet and Menawethan have risen by about 150% and 112% respectively, and it is clear that the major increases have been on islands where nest site requirements are suitable and sufficient space exists to accommodate new breeding pairs.

On both islands breeding density appeared to have reached a critical point in 1974, and future increases of a similar magnitude will probably be impossible. On Annet in particular there are a number of indications that the present population represents the highest level that the island can support: the 1974 total of 378 pairs is in fact a decline on 400±5 nests counted in late May 1973, though differences in census techniques and the pricking of at least 150 eggs in that year may count for some of the difference. However, it is clear that in the last year Great Blackbacked Gulls at their major breeding station in Scilly did not increase, and the combination of limited vacant space and the pattern of predation observed in 1974, resulting in high populations per island enjoying indifferent breeding success, indicates that the islands at present support close to the maximum number of Great Blackbacks possible. For future increases of significant proportions to occur, the birds would have to either annex all hitherto unoccupied areas at breeding sites - see Map 7B for the current situation on Annet - or modify their nesting requirements to tolerate regular human disturbance at as yet uncolonised sites like Shipman Head and Gugh: the former is rather more probable than the latter, as declines since 1964 on Great Ganilly and Arthur in the Eastern Isles reflect the increase in landings by holidaymakers during the breeding season.

In conclusion, for the above reasons I would consider a total population in Scilly of over 1850 pairs by the end of the next decade unlikely.

RESULTS OF 1976 SURVEY

The survey of Annet in May and June 1976 by Bailey gave an estimated breeding population of 352 pairs $\pm 10\%$, being a drop of 26 pairs since 1974. This drop occurred in the areas which gulls were experimentally in 1976 eliminated by baiting in 1975 where in fact only 8 pairs nested, compared with 40 pairs the previous year (see Map 19).

The Great Black-backed Gull population on Annet has clearly stabilised since about 1973 (c 400 pairs), following a great increase during the preceding ten years, which involved a considerable expansion in distribution over the island. The reason is almost certainly that breeding density in suitable habitat has now reached a level which precludes any further increase. Allied to this, it may also be that in recent years density-dependent pressures in the form of more frequent intraspecific predation of eggs and young have limited average breeding output, resulting in reduced recruitment of new pairs to the population. Much detailed research would be needed to confirm this second point.

Narcotic poisoning is clearly an efficient method of eliminating Great Black-backed Gulls on territory and, moreover, inhibits further occupation of cleared areas in at least the subsequent year.

and the various and abortive management policies that have been implemented are included under 'Historical Situation and Recent Changes in Status'. Whether these have actually altered the birds' distribution in Scilly is hard to say: some possible changes from this cause are postulated under that heading.

The only known instance of destruction of Great Blackbacks in 1974, other than the justifiable measures administered by the gamekeeper of the Tresco Estate, concerned egg stealing from Gweal in late May: a landing here on 7th May revealed 37 clutches of 3 eggs, but later in the month other observers reported no occupied nests at all, the set of events strongly suggesting that eggs were taken by visitors from nearby Bryher. Observations at the island in late July showed that the interference probably had little effect on breeding productivity, as young were present in the standard proportion to adults at this time.

WEATHER:

It is considered unlikely that poor weather in 1974 had deleterious effects on the Great Blackbacks' breeding success. Chicks are most probably better able to withstand cold and rain than other *Larus* progeny, and on Annet, the Western Rocks, and most other sites chicks would eagerly seek out sheltered spots within the nesting territory in order to evade predatory Great Blackbacks: this behaviour would also protect them from the full impact of elemental conditions.

It is at present hard to assess whether poor weather inhibited feeding activities to the extent that young perished through irregular provisioning. As with the other *Larus* gulls, the absence of any previous studies on the quantities and patterns of dry food samples in the nesting area means that no comparisons with feeding habits in more fecund breeding seasons can be made. However, I would think that the catholic diet and predominantly inshore feeding habits of the Great Blackback made serious food shortages improbable, and certainly a much less likely cause of poor breeding results than with Lesser Blackbacked Gulls. The influence of poor weather on predation, particularly on Annet, is discussed on pages 70-72: again, unlike the situation with Lesser Blackbacked Gulls on the island, the larger bird's more protracted hatching period would have reduced the impact of particularly poor weather at any one time.

OTHER INFLUENCES:

As shown on Map 7, large concentrations of Great Blackbacks are to be found on Great Innisvouls and Menawethan in the Eastern Isles, both islands that support populations of Brown Rats. There is no evidence from other breeding sites in Britain that Brown Rats do any damage to Great Blackback eggs or young, and this would seem to be the case in Scilly too. Whether the rodents' lack of interest in this potentially rewarding food supply is the product of intimidation - and occasional mortality - by the gulls, or because in their isolation they have never 'learned' the habit of sucking eggs on the two islands, is an interesting question.

Few other possible threats to Great Blackbacked Gulls were discerned in Scilly in 1974

density in depth: despite nesting proximity of an average 7 metres at the shoreline by Smith Sound on the Southeastern side of Annet success here was low, probably because eggs and young were more vulnerable than those situated in the more widely populated thrift areas: although this was not proved in 1974, it may well be that pairs breeding in the midst of the large 'colonies' enjoys greater security from predatory attacks than birds situated on the fringes of established nesting areas.

The historical resonances of the 1974 breeding pattern concern the fact that the concentration around Carn Irish is located in the first area to be colonized by Great Blackbacks on Annet around 1910. The high density suggests that breeding success over the years in this area has been good - in 1974 at least 4 breeding individuals carried B T O rings, indicating that they had been ringed as pulli during the first half of the 1960s and had returned to breed close to their parents: in all, the higher nesting density and breeding success, coupled with consistently high populations here since 1960 and probably before, indicates that these 61 pairs are the most stable section of the island's population. Breeding experience, in relation to site choice, was therefore considered an important condition for successful rearing of young: success was lowest on the southern half of the island which has only been colonised since 1963.

Intraspecific predation was thus influenced by nesting density and breeding experience. The scale of predation noted in 1974 was clearly the product of a high island population of Great Blackbacks, and it may be assumed to be more intense than during periods of expansion such as between 1960 and 1967 - see page 30. Human disturbance, mostly by the writer in the course of work on the island, was unusually frequent on Annet this year, and might have contributed to an exceptional breeding result because opportunities for predation would have been increased. However, the generally similar breeding success on Menawethan, which is directly comparable to Annet in both terrain and breeding density, suggests that predation has now become a major limiting factor at heavily populated islands in Scilly. The situation at the smaller breeding stations is rather different, and is discussed below and under 'Historical position and Recent changes in Status'.

SITE SELECTION AND DISTRIBUTION

Great Blackbacked Gulls in Scilly choose a fairly wide range of nest sites, varying from scattered groups along low lying beaches to high rock outcrops and pinnacles; islands frequented are as different as Northwethel off Tresco and Rosevear in the Western Rocks. Breeding strength is directly related to the extent of suitable nesting habitat. The North Western Group of islands, along with similar sites like Foreman's group and Ragged Isle, hold small numbers as nesting is confined to the limited areas of topsoil and vegetation; on the Western Rocks, and especially on Melledgen and Rosevear, both traditional strongholds of the species, birds exploit the shelter and protection of the storm beaches that characterize the mostly vegetationless and exposed islands; numbers on the Eastern Isles are dependent largely on the height and density of plant growth, bracken and bramble-dominated islands like Great and Little Ganinick and Little Gannilly holding smaller numbers per acre than Great Innisvouls and Menawethan; the last two sites, Gweal, and of course Annet represent the optimum nesting habitat for Great Blackbacks; sizeable, generally level islands with short vegetation of either sea beet, grass or thrift, which can support high numbers breeding in loose association with one another, thus enjoying the benefits that come from colonial, or in this case semi-colonial, nesting.

GREAT BLACK-BACKED GULL LARUS MARINUSCENSUS RESULTS:

1583 estimated breeding pairs. Map 7.

CENSUS METHODS:

All known places where Great Blackbacks were present during the 1973 breeding season were visited in 1974. Ideally, counts of nests should have been made at all sites, but with 33 far-flung breeding stations in Scilly comprehensive coverage in this manner was not possible. At the largest colonies on Rosevear, Annet, Great Innisvouls and Menawethan counts of nests and detailed estimates of pairs present were made at least twice, as numbers at these sites are most likely to reflect population changes in future years. Single landings were made on Melledgen, Mincarlo, Illiswilgig, Gweal, Foreman's Island, Northwethel, Pednbrose, St Helens, Tean and all of the Eastern Isles with the exception of Little Ganinick. These sites were also surveyed from boats, and second sets of figures compiled for every breeding station other than Pernagie and Guthers. Counts from the water were of pairs apparently holding territory; numbers of loafing and patently non-breeding Great Blackbacks not included in the totals of breeding pairs. Notes on some of the larger congregations of such birds, and on non-breeding birds holding territory away from usual nesting sites, are given on Map 7C. Comparisons between first and second counts showed only small differences of about 15%, and so the census method seemed generally satisfactory. Serious difficulties were encountered only at Rosevean, where the breeding population was obscured literally by the topography of the island and numerically by visitors from neighbouring Rosevear: numbers for this site are therefore just approximate estimates.

In all, the estimated number of breeding pairs is most probably within 10 to 15% of the actual total. Margins of error are most likely to come from under-rather than overestimates.

BREEDING SUCCESS

In 1974 considerable variations in dates for laying, hatching and fledging were noted among Great Blackbacks: pairs on the Eastern Isles were on the whole 1 to 2 week ahead of those in the South Western group of islands. The first clutch hatched on Menawethan around 7th May, almost 3 weeks before any on Annet, and the first flying youngster was seen on Great Ganilly on 12th July, at least a week in advance of fledging progress on Annet. The reason for these differences was undoubtedly meteorological, pairs on the Eastern Isles benefiting from greater shelter from westerly winds during the early weeks of the breeding season: it is interesting that on Annet the handful of early clutches at the end of April were all on less exposed south and east facing sites.

Clutch sizes also varied substantially, and on Annet at least 20 single eggs were incubated, as well as more usual clutches of 2 and 3. Notes on clutch sizes were not taken on all visits to colonies because the high level of egg predation would have made the necessarily intermittent details of little use. At the densest section of the Annet colony the average clutch size was 2.25 eggs per nest when 16% of the nests had chicks: observations suggested that this was a marginally higher average than elsewhere on the island.

RESULTS OF 1976 SURVEY

The survey of Annet by Bailey gave a total for this species of 221 pair a small drop from the 1974 figure of 234 pairs (Map 21).

The Herring Gull population on Annet has decreased considerably in the last fifteen years, from 500+ pairs in 1960. This decline, levelling off since 1974, can be linked with the expansion and stabilisation of the Great Black-backed Gull population on the island.

St Agnes, where around 10 pairs have held territories since 1967 and most probably before. Whereas Great Blackbacks are almost exclusively confined to fairly inaccessible stacks and islands, just under 50% of Scilly breed in what may be termed 'semi-inhabited' areas like Shipman Head, Samson, St Helens, Tean, Whit Island and Daymark, where access by people is regular but limited by tide and boats. It is significant that the most populated island of the Eastern Isles is Great Gannilly, despite the fact that it is also the one most visited by trippers.

Occasional human disturbance in 1974 had few apparent detrimental effects on breeding success. Numbers of young raised in proportion to total adult pairs on the Gugh, conformed closely to the success rates elsewhere, and 38 pairs that nested on the more disturbed northern half of Samson enjoyed greater breeding success - 1 young to every 1.9 pairs - than birds in seemingly more suitable conditions on the southern hill.

The eggs of the Herring Gull make of course excellent eating, and their sociological role has changed over this century from being a staple of isolated maritime communities to an expensive delicacy to be purchased at inflated prices in metropolitan restaurants. No incidents of egg taking by people for food or profit were recorded in 1974, and it may be assumed that the decline in human demand for eggs has been a major factor in the species' increase in Scilly.

WEATHER

As described on page 82, the Herring Gull has a particularly wide-ranging diet, and chick mortality from food scarcity caused by bad weather may be ruled out, though in common with other *Larus* species rain and poor visibility may well have instigated more frequent predation and cannibalism.

Mortality through respiratory congestion and cerebral damage may well have limited chick success in 1974. Heavy rain on 23rd June, when most young were under 2 weeks old, was followed next day by numerous dead along breeding cliffs and beaches on Annet: the connection between the two events may have been circumstantial rather than causal, but it was revealing that the vast majority of dead chicks were situated in territories on the flat tops of rocks where shelter from driving rain would be non-existent; at Carn Windlass 3 of the 4 young that survived to the flying stage were hatched and raised in natural caves under the rocks that supported the bulk of the sub colony, and were thus well sheltered from the full impact of westerly gales in early July. In conclusion, poor weather was considered a likely reason for poor breeding success at exposed nest sites.

HISTORICAL SITUATION AND RECENT CHANGES IN STATUS

Notes on the past history of Herring Gulls in Scilly are almost non-existent: the lack of documentation is a classic example of how widespread and numerous species have so often never received proper attention in the past. Because of this changes in status are hard to assess, and fact must of necessity be diluted with speculation.

In 1885 Herring Gulls bred on the Eastern Isles, Annet, Shipman Head, Round Island, Menavour, Scilly Rock, Maiden Bower, Mincarlo, the Western Rocks, and most probably at other sites as well. At the first two localities great numbers nested in profusion on grassy banks and slopes, suggesting that habitat selection before the advent of Great Blackbacked Gulls was rather different to the situation today. Of the named sites, only Maiden Bower is no longer occupied.

HERRING GULL LARUS ARGENTUSCENSUS RESULTS

2249 estimated breeding pairs. Map 6.

CENSUS METHODS

All breeding sites located during rough estimates in 1973 were visited and counts made of pairs on territory. At many sites, including Annet, Mincarlo, Puffin Island, St Helens, Samson and others, these were combined with counts of nests. Totals are considered accurate to 10-15%, apart from on Shipman Head, Bryher, and perhaps Daymark Head, St Martins where numbers may have been underestimated. The small population on Menavour was not counted precisely, and numbers here are only an approximate estimate. Numbers and locations of non-breeding Herring Gulls, including immatures in the ratio of 1:10 adults, present regularly during the summer are shown on Map 6B.

BREEDING SUCCESS

Clutch sizes of Herring Gulls at hatching time were markedly higher than with other Larus Gulls in 1974, on both Samson and Annet all nests hold between 2.5 and 3.0 eggs. Breeding success on Samson was around 1 young fledged to every 2.5 pairs: 164 censused pairs reared 59 young, but success was rather higher among Herring Gulls breeding in the Lesser Blackbacked Gull colony. On the Gugh 51 pairs raised a minimum of 16 young to the flying stage, an average of about 1 to every 3 pairs, while on Annet 234 pairs produced less than 15 fledged birds. Observations on Mincarlo, the Easter Isles and other small populations in late July and August suggested that breeding success was likewise poor.

ADVERSE PRESSURES OBSERVED IN 1974GULL PREDATION

This is discussed in greater detail on pages 69-70 under Predation. As mentioned there, predation took two forms, intraspecific and damage from Great Blackbacked Gulls. Egg losses were few, but consumption of chicks was considered frequent at all sites. Analysis of breeding successes at different colonies suggests that cannibalism accounted for a significant proportion of young: in areas where Great Blackbacks were relatively absent numbers fledged in relation to populations were remarkably constant: for example, 23 young were around Puffin Island in late July, indicating a success rate of 1 to every 2.8 pairs, very similar to the situations of Samson and Gugh. The much poorer success on Annet was without doubt largely the result of Great Blackback predation added to cannibalism, and as noted on page 22 the most successful, if that word may be applied to such desultory productivity, sub-colony was situated in a naturally protected area at North East Porth away from the attentions of Great Blackbacks.

SITE SELECTION

Herring Gulls mostly breed on the lower slopes and rocks of uninhabited islands, but choices and density vary according to local conditions. On 'soft' as opposed to rocky islands major concentrations occur along boulders and rubble beaches, often overspilling onto the grass and sward slopes above: such colonies are to be found on Little and Great Ganilly, Whit Island, Tean, Northwethel and Samson among others.

RESULTS OF 1976 SURVEY

Bailey's count for this species on Annet in 1976 showed a considerable drop since 1974 and time was taken to double-check the figures. Breeding population was 181 pairs as against 541 pairs in 1974. In both major breeding sites numbers were down, the southern site to 73 pairs from 242 pairs and in the centre of the island from 273 pairs to 74 pairs. Both these sites were also recorded as down in Herring Gull numbers. It was noted that in 1974 these areas were recorded as having vegetation cover and bracken, whereas in 1976 they showed sparse grass and bare ground. A new site containing 8 pairs was established on the north-east point (Annet Head). It is of interest that the establishment of this site is precisely between the two colonies of Puffins, which in 1974 contained 18 pairs and 24 pairs respectively and in 1976 contained 8 pairs and 6 pairs.

The decrease in the Lesser Black-backed Gull population on Annet is not unexpected, following desultory nesting success in 1974 and reduced numbers in 1975. In addition to predation of eggs and young by Great Black-backed Gulls, bad weather at hatching was a major factor limiting breeding performance in 1974, and absent pairs have probably moved to more sheltered sites elsewhere in Scilly. It is not strictly accurate to describe the main nesting habitat in 1974 as bracken, but vegetational changes, perhaps associated with the drought over the last two summers, may have had some influence on the population level, since on Annet nest sites generally are more open to bad weather and predation than on other islands supporting large concentrations of Lesser Black-backed Gulls. More detailed information would be needed to establish any casual relationship between the new sub-colony at Annet Head and a decline in Puffin numbers nearby. The decrease mentioned for Herring Gulls is incorrect: at the southern site they were 42 pairs up on 1974, and the increasing habit of nesting among Lesser Black-backed Gulls away from the littoral is an interesting feature of the Herring Gull population in Scilly.

In contrast, the population on Samson has increased dramatically since 1950, despite more frequent visits by holidaymakers to the island. The colony is partly protected by its size: 500 wheeling and squalling gulls overhead will deter all but the hardiest tourist, and predation of eggs and chicks by other Lesser Blackbacks following human disturbance is offset by the density of nests in many areas: predatory individual gulls seldom have sufficient time to attack their neighbours' young before being forced to 'defend' their own against the intruder. The south hill of Samson also lacks any suitable places for picnics, sunbathing and the like, and so most people stay on the beaches towards Bryher. Indeed, it is more than likely that a sizeable proportion of visitors to the island are unaware that over 3000 pairs of gulls nest within a mile of their stretch of sand! Unlike on the Gugh, much of the breeding area is also impenetrable to most mortals.

In the past, especially during the Second World War, large quantities of eggs were collected by islanders for food. With increasing affluence in recent years this habit has largely fallen away, and in 1974 no colonies showed signs that eggs had been taken.

HISTORICAL SITUATION AND RECENT CHANGES IN STATUS

Lesser Blackback Gulls, have as far as the records show, always bred in Scilly, though in smaller numbers than today. In 1880 Rodd in 'Birds of Cornwall' described them as 'not uncommon in winter and early spring', presumably referring to the northward migration up Channel rather than overwintering in Scilly, and one can assume that if the breeding population had been considerable this feature of their status would have struck the writer more forcibly. In 1885 they bred on all the Eastern Isles, on Shipman's Head, Round Island, Menavour, Scilly Rock, Maiden Bower, Mincarlo, Annet and the Western Rocks. Some of these sites are of course occupied now, but breeding on Round Island, Menavour, Maiden Bower and, to a lesser extent, on the Western Rocks supports a comment in 1880 that nesting was mostly around the lower rocks of islands. More typical of today's breeding behaviour is a note from 1908 that calls them the most numerous gull on Annet, thickly distributed on the bracken at the centre of the island. The breeding population presumably expanded over the next 40 years - in 1936 innumerable numbers were on Annet and some on Samson, previously not colonised - though not by the same rate of increase that has typified the species' progress in the last 20 years. A survey in 1946 gave the population at around 550+ pairs, though the Eastern Isles were not covered: major concentrations were on St Helens, Samson (c150 pairs) and the Gugh. During the War years numbers on Annet moved to the Gugh and perhaps to Samson, probably to avoid egg collecting caused by hardship and isolation from the mainland.

Since that time the population has increased by at least 250%. Few counts were made before 1973, but it seems reasonable to speculate that in common with other major colonies in South West England that the major expansion has taken place since around 1960. In 1967 700 to 800 pairs were present on Annet, and while figures for sites with limited breeding space like Shipman Head and Whit Island have not increased spectacularly, on Samson the current population is ten times the 1946 breeding strength: this suggests a rate of increase of about 23% per annum, and quite probably rather higher since 1960. A detailed but regrettably not comprehensive survey of the colony in May 1973 totalled c1420 pairs of *Larus* gulls, and allowing for Herring Gulls nesting in the colony in the approximate ratio of one pair to every eight of Lesser Blackbacks, the breeding strength last year was most probably around

Black-backed Gulls' eggs and young constituted one of the very few instances of specialised predation in Scilly in 1974, the nature and main features of this are discussed in some detail on pages 67-69. In order to avoid repetition, only a typical example of the scale involved is given here: on 22nd June, 5 successful attacks on eggs and chicks were witnessed between 1300 and 1800 hours, out of at least 15 attempts in all. Predation was greatly increased during spells of poor visibility and rain, and again the phenomenon is discussed in detail later on.

The higher success rates on Samson and St Helens were clearly related to the scarcity of Great Blackbacks at these two sites. 1 pair of the latter bred on Samson, and a few visiting birds from White Island and Tresco were seen regularly, but no incidents of predation were seen on numerous visits to the colony in the breeding season - it is probable that the size of the Lesser Blackback colony deters marauding Great Blackbacks.

A second reason for the discrepancy between breeding success at the two main sites may be related to differences in terrain. On both islands birds nest mostly in the bracken areas broken by patches of bare earth or low vegetation, but on Annet the stretches of Yorkshire fog grass were underpopulated, while on Samson the comparable 'bald' areas supported the highest density of breeding pairs. If Great Blackbacks are present, such open spots would be exposed and vulnerable to attacks. The colony on Samson also most probably benefits from the steepness of the southern hill, which is well strewn with protective granite rocks and ruined field walls. On Annet the ground is mostly flat or gently rounded, conditions which would facilitate predation by Great Blackbacks based on overlooking rocky outcrops.

SITE SELECTION:

As mentioned above, Lesser Blackbacked Gulls in Scilly largely nest in bracken. Map 8 shows how on Annet breeding areas are strictly correlated to bracken cover. The habitat is also chosen on Puffin Island, Northwethel, St Helens, Gugh, Whit Island and all of the occupied Eastern Isles apart from Menawethan and Great Innisvouls, as well as of course on Samson. It is thought that in general bracken is increasing in range on many islands in Scilly, especially on Annet and on the Eastern Isles, and this may well be beneficial for Lesser Blackbacks. Much smaller numbers breed on thrift areas, usually when these are mixed with other vegetation as on Daymark Head, White and Whit Islands and some parts of St Helens. Less than 5% of the population breed away from vegetation: on rocky stacks in the South Western and North Western groups Lesser Blackbacks nest on the rock cliffs and talus along with Herring Gulls, but the numbers on Scilly Rock and Shipman Head, 26 and 69 pairs respectively, are unusual for exclusively rocky areas. It is possible that populations here are large because of the absence of significant numbers of breeding Great Blackback gulls. With the notable exception of Annet, concentrations of Lesser Blackbacks tend to be on islands not densely populated by Great Blackbacks and there is little doubt that competition between the two species would be decided in the latter's favour. However, the lack of previous information on the Lesser Blackback's distribution in Scilly makes any conclusion on this matter impossible, and all the evidence points to vegetational cover as the determining factor in the species' breeding range.

1960, but to my mind this is a slight overestimate: Shags are much more plentiful to the West and North of the islands than to the East, and the first two areas have been covered more often in the past, and a rather excessive total would result if numbers were taken as standard for the islands as a whole. Comparisons of figures at Melledgen and Rosevear in 1967 and 1974 show that little change in status has occurred, though it may be assumed that with lessening persecution numbers are increasing.

RESULTS OF 1976 SURVEY

Bailey records 129 pairs of Shags on Annet in 1976, this being an increase of 34 pairs over 1974's total of 95 pairs. However the distribution map (Map 20) indicate only 112 pairs so the exact situation is not clear. The breeding population may have been slightly under-recorded in 1974, but an increase would be consistent with a general absence of adverse pressures at local level and my impressions of numbers on Annet in May 1975.

SHAG PHALACROCORAX ARISTOTELISCENSUS RESULTS:

c750-c900 breeding pairs. Map 4.

CENSUS METHODS

Little attention was paid to Shags during seabird studies in 1974: accurate estimates of nests or breeding pairs are very time consuming, and so on many islands Shags tended to be ignored in favour of what were considered more important species. However, precise counts of nests were made on Annet, Mincarlo, Illiswillgig, Scilly Rock, Gweal and Little Innisvouls, and reasonable estimates on Melledgen, Rosevear, Castle Bryher, Maiden Bower, Menavour, Ragged Island and White Island off Samson. Numbers on Rosevear and Gorregan were assessed on two occasions, but at other sites like Little Granninick, Menawethan, Great Innisvouls and Hanjague populations were judged to the nearest 50 pairs. The census result of c750-c900 breeding pairs is therefore based on a combination of accurate counts and, I hope inspired, estimates: it should not be taken as a definitive statement on the population. However, I would say that total breeding numbers lie within the figures given, and the detailed counts on the North Western group of islands will be a useful basis for any future studies of the Shag's status in Scilly.

In addition to the breeding population, the Scillies also hold numbers of non-breeding Shags, in the main first summer birds. Counts of social gatherings were made during the summer: maxima in the West were 340+ in Smith Sound off Annet on 18th May, and 400+ around Great Crebewethan on 18th June, in the East, 112 between Great and Little Ganillies on 20th May. Gatherings tend to be larger after the breeding season, when numbers are swelled with birds of the year, the largest group seen were two separate flocks of 710+ and 230+ between St Agnes and St Mary's on 23rd August.

BREEDING SUCCESS:

At all sites visited the average clutch size was around 4 eggs per nest, but a clutch of 8 eggs was found on Great Innisvouls in early June, surely the work of two females. Counts of pre-fledged chicks on Mincarlo in late June showed 157 birds in 82 nests, indicating that about 50% of hatched young perish during the first 2 weeks of life and that 2 young per nest is the typical survival rate. Counts of fledged young about Carn Irish on Annet in late July, where 45+ juveniles raised from 39 nests, confirmed that the breeding success for Shags is well over 1 young per pair.

As with Cormorants, recoveries of first year birds ringed by St Agnes Bird Observatory show mortality of between 8% and 19% occurs after the breeding season, mostly during dispersal during the autumn.

ADVERSE PRESSURES OBSERVED IN 1974

Breeding in Scilly is largely confined to uninhabited stacks and islands. Shags react with deep revulsion to human presence in nesting areas, but unlike Cormorants as often as not they sit tight and hiss at the intruders rather than flee the island. Nests are very seldom built in exposed positions and almost always well hidden under rocks or cliffs, and so predation by gulls following human

CORMORANT PHALACROCORAX CARBOCENSUS RESULTS:

60-62 breeding pairs. Map 3.

CENSUS METHODS:

Breeding sites were visited and nests counted. No landing was made of Little Ganinick, where no birds in breeding plumage were seen in late April. Numbers at this site were therefore based on counts of fledged young in the vicinity, and are most probably close to the actual figure.

BREEDING SUCCESS:

In Scilly Cormorants have a protracted breeding season: in 1974 first eggs were laid in mid-March, last in early June. Counts of clutch sizes and chick survival were complicated by the wide variation in breeding progress, but on Illiswilgig in early May both the clutch size and chicks under 2 weeks old averaged 2 per nest. Most chick mortality occurred during the week after hatching. A count of juveniles at Mincarlo on 1st August showed c15 young at the flying stage, and a success rate of 1 per pair is considered normal for the species. Recoveries of Cormorants ringed as pulli by St Agnes Bird Observatory between 1962 and 1964 indicated substantial mortality - 10 +% - during the southwards dispersal in Winter.

ADVERSE PRESSURES OBSERVED IN 1974

Definite threats to the population witnessed in 1974 stem from the common breeding site requirements of Cormorants and Great Blackbacks. At the four current breeding stations both species nest in close proximity, and predation was recorded: 5 corpses of young under 10 days old on Melledgen and Illiswilgig. This predation was clearly of a casual, opportunist nature, with the Great Blackbacks exploiting an occasionally accessible food source. Much greater damage occurs when access by gulls to young is made easier by human presence at the breeding site. Unlike Shags, Cormorants show no fine parental feelings in the face of human intruders, abandoning eggs, young and island as soon as the first step from the punt is taken. They are slow to return after visitors have gone, and it is during the period immediately following the people's departure that the exposed eggs and chicks are most vulnerable to Gulls predation.

Landings at breeding stations can therefore indirectly cause considerable damage, and during 1974 some inevitably came from census work, though every effort was taken to complete counts as speedily as possible - for obvious reasons the resulting damage was not assessed. Less disciplined unauthorised visits might reduce breeding success to almost nil, both by lingering ashore too long and by unwittingly 'driving' older young out of their nesting territories and over cliff edges, a very real danger.

Kleptoparasitism by Great Blackbacks was recorded twice during the breeding season at fishing grounds; the food involved was plaice. This form of gull interference probably plays no significant part in breeding success.

RESULTS OF 1976 SURVEY

As in 1974 a reliable counting method for this species was unobtainable but on the South West Storm Beach census area, soundings gave 108 pairs, 4 pairs up on 1974. On other suitable breeding beaches investigators were agreed that at the time of visiting, the population appeared to be a little higher than the 1974 figure, but this was not quantified.

No detailed comment can be made on these results, because of the limitations of the census technique employed in both years, the many variables involved in attendance by Storm Petrels at colonies in the course of the breeding season, and the difference in the timing of the two surveys. For these reasons, the close agreement between the counts on the South West Storm Beach census area, although pleasing, may be coincidental. However, it seems reasonable to infer that the population level has not changed markedly; this is as expected, since on the information available at present adverse pressures appear to be minimal.

the nesting rhythm may have been greater in 1974 following the exceptional gales in January and February which wrought major changes over much of the shoreline on Annet. Whether the total area of suitable habitat diminished as a result is unknown, as are previous populations.

Petrels also breed in small numbers 'inland', at the bases of rocky outcrops and carns usually within 30m of the sea. Such sites are around Carn Windlass and Annet Head. From the number of corpses found at the second place it would seem that birds at these sites are more vulnerable to predation than elsewhere, probably because they have to traverse Great Blackback territories on their way to and from the sea. At Annet Head petrels may also rest in burrows at the top of the low cliffs: bad weather and safety conditions made proof of this unobtainable. The relationship, causal or otherwise, between such sites and density along the storm beaches, is not known.

OTHER PREDATORS:

These are absent on Annet, the main breeding station. On the Gugh, where occupation has always been intermittent, the remains of 13 petrels killed by a cat were found on 22 July. All were less than a week old, and the number suggested they had been killed for fun rather than food. Cats have caused similar damage at petrel colonies elsewhere in Britain, and at one island off Southern Ireland 1000 corpses represented less than a year's work by one animal. In this context, and in relation to breeding strength on Annet, damage on the Gugh in 1974 was insignificant.

The breeding site requirements of Storm Petrels make them particularly vulnerable to predation by Rats, to which adults, chicks and eggs would be most attractive takings. The presence of Brown Rats may limit the Storm Petrel's breeding range in Scilly, and it is interesting that birds were around Burnt Island in Smith Sound during the summer, perhaps the least accessible place on St Agnes to the island's Rat population.

HUMAN DISTURBANCE:

In the normal course of events this would never occur, for obvious reasons. Applications to ring petrels on Annet have been resisted in recent years, and the history of 1 bird in 1974 gives some support to this policy. It was located accidentally in late June during excavations on a prehistoric midden, and handled three times over the next months - understandable in view of how little the Storm Petrel usually does for curious humans! On a fourth visit the bird was found to have deserted, and the egg, laid before early July, smashed. Deliberate, even if brief, disturbance to nesting birds may therefore cause desertion.

HISTORICAL SITUATION AND RECENT CHANGES IN STATUS

Storm Petrels have long been regular breeders in Scilly. Although their presence was not recorded before the nineteenth century, it seems unreasonable to assume that such elusive birds would have impinged upon our forefathers' consciousness to any extent. In the middle of the last century their stronghold was Rosevear, where they were described as 'fairly common' in 1863 and 'tolerably common' during the 1870s. Numbers were however 'greatly diminished' around 1910, while they were first recorded on Annet in 1903. By 1915 'thousands' populated the island.

STORM PETRELHYDROBATES PELAGICUSCENSUS RESULTS

Annet: 1800+ pairs; St Agnes: present in small numbers; Gugh: present in small numbers.

CENSUS METHODS

No reliable method of counting, or even estimating, large populations of Storm Petrels is known. Work on Annet in 1974 was based on marking boulders under which birds were singing, a technique first applied in 1961. A total of 104 presumably breeding pairs were located along a stretch of storm beach south of Carn Windlass on the southern half of the island between 22nd and 24th June, around the peak time for egg laying. The area censused measured 30 metres by 10 metres. Counts were made on three successive nights so that a large proportion of irregular 'singers' would be included in the total: on the third night only 14 additional birds were heard, suggesting that the majority of the resident population was accounted for. Singing birds were found on all suitable beaches on the island, these were mapped and density of occupation roughly assessed. Results are shown on Map 16.

Total breeding population was estimated in the following way: on Annet there are just over 1100 metres linear of suitable nesting habitat, varying in width between 8 and 12 metres. Density along the censused beach was c1 pair per 3 metre², rather higher than elsewhere, and a density rate of c1 pair per 6 metre² was considered realistic for the island as a whole. Breeding population was therefore calculated to be $11000 \div 6$, 1800 pairs.

Sources of error in this method are many and obvious. The relationship between singing birds and breeding progress is as yet imperfectly understood; numbers of non-breeding birds at petrel colonies have never been counted, but are thought to be large; the extent of visiting between colonies is a mystery, as is much of the significance of behaviour once ashore. Constraints of time, weather and safety made impossible measurements of the variations in occupation rate on the scale required by a more accurate census, and experience showed that the relative locations of singing birds are often highly subjective, varying from observer to observer.

For the above reasons the 1974 estimate of 1800 pairs of Storm Petrels on Annet cannot be taken as anything more than a rough assessment of breeding strength; it should also be stressed that the actual population most likely well exceeds this figure, which indicates the minimum level of breeding numbers. Because of the seemingly insurmountable problems a more sophisticated census would involve, and the lack of any reliable means of interpreting ringing results, the methods used and results gained in 1974 are of value, if only as deficiencies to be improved upon in future years, as the 1961 technique was extended and refined in this.

BREEDING SUCCESS

Not known.

ADVERSE PRESSURES OBSERVED IN 1974

There are obvious problems involved in studying pressures on or, for that matter, any behaviour by Shearwaters. However, a close watch for predation by Great Black backed Gulls was kept and 22 corpses were found on Annet between mid May and early August. The location of these corpses is shown on Map 15 and their relationship to Great Blackbacks' behaviour is discussed fully on page 60. The actual total was most probably in excess of 22 corpses, as killed birds are sometimes taken down to the sea and washed before consumption by the Great Blackbacks: such corpses are unlikely to remain present and notable for long. What is clear is that predation in 1974 had no significant impact on the breeding population of Shearwaters. In comparison with the predation situation and the status of the Manx Shearwaters in earlier years, it would seem that the declining numbers no longer represent an economical food supply for gulls.

HISTORICAL SITUATION AND RECENT CHANGES IN STATUS

Problems that beset present day field workers were shared by their predecessors, so most historical records are more subjective than precise: for example, between 1947 and 1949 one observer noted that Shearwaters were 'very much diminished on Annet'; in the following year, 1950, a different visitor stated numbers were 'well maintained', as they would surely appear if unaware of the decline on previous years. Similarly, counts have often been given of rafts offshore, but since the time of year is seldom mentioned these are of little use as historical evidence.

However, there can be little doubt that Manx Shearwaters once bred more abundantly in Scilly than they do today. In 1826, sizeable flocks were said to always rest 'in St Mary's Bay' at midday, and unless they have undergone radical transformation in their habits Shearwaters would seem to have been at least more widespread in those days. Again, in 1924 the noise over Annet each night was 'deafening', returning to land regularly within an hour of sunset. This year, calling in any quantity - over c30 birds involved - was heard on only one night out of eighteen ashore.

As mentioned above, numbers decreased during the 1920's and 1940s. A major cause, though other factors may have played a part, was certainly predation by Great Blackbacked Gulls: in 1946, 'enormous numbers of Shearwaters are killed by these Gulls, one nest of which was composed entirely of bodies of Shearwaters; the nest was over two feet in diameter and nine inches high! 'Bodies litter the ground at the rate of 20 or 30 in ten square yards'. Research in past years on Skomer, Pembrokeshire, has suggested that even with an annual loss through predation of 8000 to 10,000 birds the breeding population of c95,000 pairs was maintained. During the years of high predation on Annet, however, it would seem that mortality was in excess of 10% of the paired birds, and so gull damage looks a reasonable explanation for part of the decline. Information, both on population and predation, is lacking for the 1950s, but 400 were ringed in one hour in 1958 by St Agnes Bird Observatory, by 1974 standards a show of great abundance.

breeding was erratic: following a maximum of 8 summering pairs in 1954, only 2 pairs were present in the summer of 1957, when successful breeding was not recorded. Since 1959-1961, however; the species has increased slowly and steadily, nesting regularly at their main breeding stations on Hanjague, Menavour and Castle Bryher, and by 1968 6 to 8 pairs were judged to be breeding.

This increase continues today, and the 1974 total of 14 apparently occupied nest sites reflects a population expanding at about 12% per annum. Numbers on Hanjague and Castle Bryher were down on past years, but the colony on Round Island, where a pair first nested in 1966, has grown. It may well be that the former residents of Castle Bryher and Hanjague have moved to enjoy the security and more sheltered slopes of the island, where a mixture of broken cliff and grassy slopes offers excellent nesting habitats.

During the summer prospecting birds were seen regularly around St Helena Whit Island off St Martins, Menawethan, Mincarlo, Rosevean and Annet. Birds at the first four localities may have been from adjacent occupied breeding sites, but the presence of birds around the Western Rocks and especially at Carn Irish on Annet points to a further colonisation of the South Western group of islands in the future.

INTRODUCTION

Between late April and early August 1974 studies were made of seabirds breeding in the Isles of Scilly. The subjects of the study were as follows:-

1. Censuses of all accessible seabird colonies, with particular emphasis on populations of the three *Larus* gulls and of Puffins.
2. Assessments of adverse pressures at local level on the breeding success of seabird species.
3. Comparison of the historical and present distribution and populations of seabird species.
4. Assessment of the scale of predatory behaviour by *Larus* gull species and its impact on other seabird populations, with a view to gull management policies in future years.
5. Investigation of the feeding ecology of *Larus* gull species during the breeding season.

The report is divided into 3 sections, each section including relevant maps and tables. The first deals with the first three subjects outlined above, and follows the Wetmore order of classification. Species are discussed individually, and observations set out under five major headings: census results; census methods; breeding success; adverse pressures observed in 1974; historical situation and recent changes in status. A general summary of present population trends of seabirds in Scilly and recommendations on future census work concludes this section.

The second section is concerned with predation by *Larus* gulls on other avian species. Incidents are discussed under the species involved, again in the Wetmore order of classification; notes on gull behaviour that causes annoyance to residents of Scilly are included, and details of recommended control measures and a discussion of applicable methods follow.

The third section gives a picture of the feeding ecology of *Larus* gulls in Scilly. The main features of the three diets are given in chart form and are discussed in general terms with observations on feeding behaviour. The overall survey presented is of necessity generalised rather than detailed, as the contents of dry food samples collected in June and July will be analysed at a later date.

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1976 SURVEY OF ANNET

During the period May-June 1976, Mr Brian Bailey undertook a short "follow-up" survey of Annet with the following objectives:-

- a. Count the Great Black Backed Gull breeding population.
- b. Count the Puffin population.
- c. Count the Tern breeding population.
- d. Note any changes in Great Black Backed Gull breeding habits in the areas, from which birds eliminated in 1975.
- e. Estimate the Storm Petrel population in the South West marked area.
- f. Note any changes on Annet since the 1974 survey.

The results of Mr Bailey's observations have been added to this edition together with comments by the original author.

MAPS

MAP	1	Breeding Fulmars, 1974	
"	2	Breeding Manx Shearwaters, 1974	Following page 58
"	3	Breeding Cormorants, 1974	" " "
"	4	Breeding Shags, 1974	" " "
"	5	Breeding Lesser Blackbacked Gulls, 1974	" " "
"	5A	Ditto on Annet	" " "
"	6	Breeding Herring Gulls, 1974	" " "
"	6A	Ditto on Annet	" " "
"	7	Breeding Great Blackbacked Gulls, 1974	" " "
"	7A	Ditto, 1964 and 1967	" " "
"	7B	Ditto on Annet 1974	" " "
"	6B	Non-breeding Herring Gulls, 1974	" " "
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"	8 *	Gull Distribution related to Vegetation, Annet 1974	" " "
"	9	Breeding Kittiwakes 1974	" " "
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"	10	Breeding Common Terns, 1974	" " "
"	10A	Ditto, 1953-54	" " "
"	11	Breeding Razorbills, 1974	" " "
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"	18	Annet - Gull Control Proposals	" " "
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* Map with overlay

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RETURN TO RSPB

GULLS AND OTHER
"SEA-BIRDS IN THE
ISLES OF SCILLY,
APRIL TO AUGUST, 1974
BY ROBERT ALLEN

A study initiated and sponsored
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Revised edition, including results
of a Seabird Survey of Annet by
B Bailey in 1976.

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