Rec. West. Aust. Mus. 1982, 10 (2): 133-165

Distribution, Status and Variation of the Silver Gull *Larus novaehollandiae* Stephens, with Notes on the *Larus cirrocephalus* species-group

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Abstract

Data on distribution, seasonal dispersal, colour of unfeathered parts and plumage stages are given for the Silver Gull (*Larus novaehollandiae*). Geographic variation within the species is analysed. Three subspecies are recognized, *L. n. novaehollandiae* Stephens of Australia (including Tasmania), *L. n. forsteri* (Mathews) of New Caledonia, and *L. n. scopulinus* Forster of New Zealand. Hartlaub's Gull (*Larus hartlaubii* Bruch) of south-western Africa is treated as a full species. The *Larus cirrocephalus* species-group comprises four species of grey-headed and white-headed gulls from the Southern Hemisphere, *L. cirrocephalus* Vieillot, *L. hartlaubii*, *L. novaehollandiae* and *L. bulleri* Hutton.

Introduction

In his monograph on the world's gulls, Dwight (1925) recognized five subspecies within the Silver Gull: *Larus n. novaehollandiae* from the coasts, islands and lakes of southern Australia north to Bernier Island in the west and the Five Islands in the east; *L. n. gunni* Mathews of Tasmania; *L. n. forsteri* of New Caledonia and coastal northern Australia from Port Darwin east and south to the Capricorn group; *L. n. scopulinus* of New Zealand; and *L. n. hartlaubii* of south-western Africa.

Although Dwight was hampered by a shortage of specimens and data on soft parts etc. his treatment of the Silver Gull has remained virtually unchanged to the present day. Peters (1934) followed Dwight and recognized all five of his subspecies. Condon (1975) recognized only two instead of three subspecies for the Australian region: *L. n. novaehollandiae* for Tasmania and Australia except northern Queensland, and *L. n. forsteri* for the south-west Pacific from New Caledonia west to Torres Strait and south along the eastern coast of Queensland to Mackay.

The main purpose of this paper is to examine geographic variation in Australia and to see if it can form the basis for the recognition of subspecies. To put the Australian variation in perspective it has been necessary to examine overseas populations of the Silver Gull and closely related species.

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Two terms used in the descriptions may need explanation. 'Mirrors' are the white areas towards the end of the primaries occurring on both webs of the first, second and in some cases the third primary (see Figure 1). 'Tongues' are the elongate areas of white or grey extending for variable distances from the bases of the primaries, usually on the outer web, sometimes on both. The primary wing patterns of gulls provide one of the most important characters used to classify them. For the purpose of this paper the primaries are numbered from the outermost inwards.

Movements are based on Carrick *et al.* (1957) and an analysis of recovery records in the *Corella* and its predecessor (*Australian Bird Bander*).

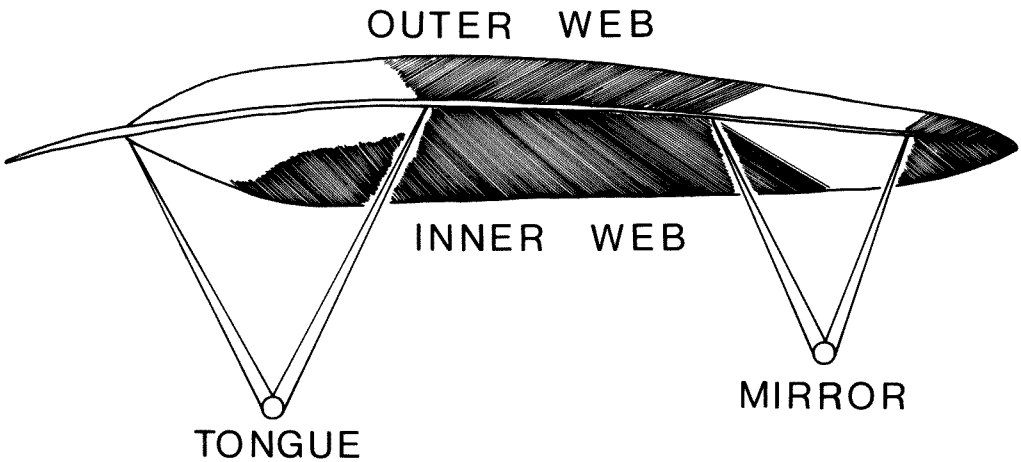

Figure 1 Primary feather showing mirror and tongue.

Materials and Methods

Two-hundred and three Silver Gulls (*Larus novaehollandiae*) held in the Western Australian Museum, South Australian Museum, National Museum of Victoria, Australian Museum, Queensland Museum, Australian National Wildlife Collection, Tasmanian Museum, Queen Victoria Museum (Tasmania), Dominion Museum (New Zealand), and American Museum of Natural History were examined in addition to 30 specimens of Hartlaub's Gull (*Larus hartlaubii*) and 50 specimens of the Grey-headed Gull (*Larus cirrocephalus*) from the British Museum, Durban Museum, Transvaal Museum, and East London Museum.

Measurements of specimens were taken as follows: length of chord of flattened wing; length of tail (along a central rectrix); length of tarsus; length of entire culmen; and bill depth at the gonys (measured vertically from point of inflection on the lower mandible to upper edge of premaxilla). The white outer bar (mirror) on the primaries was measured along the shaft on each web or vane (see Figure

1). The length of white at the base of the first three primaries (tongue) was measured along the shaft on each vane (see Figure 1), and the length of black on the fourth primary was measured from the tip to the white tongue on the outer web.

Data on unfeathered parts were taken from labels unless otherwise stated.

Variation in the Silver Gull

The Australian, New Caledonian and New Zealand populations of the Silver Gull are treated under the following geographic regions: (1) Tasmania, (2) New South Wales, (3) Victoria, (4) South Australia, (5) Archipelago of the Recherche (Western Australia), (6) Albany to Perth (Western Australia), (7) Fisherman Islands to Houtman Abrolhos (Western Australia), (8) Shark Bay to Exmouth Gulf (Western Australia), (9) Barrow Island to Broome (Western Australia), (10) Northern Territory, (11) Queensland, (12) New Caledonia, and (13) New Zealand. This facilitates comparison of the more distinctive populations, and data on soft parts and movements are more easily discussed.

(1) Tasmania

The Silver Gull is common on all coastal waters around Tasmania. It penetrates well up the major rivers and also occurs on the lakes in the Central Highlands. The breeding distribution is mapped in Figure 2.

Tasmanian birds differ from all other Australian populations in having the greatest amount of white on the primaries (on both tongues and mirrors), especially on the third primary (see Tables 1, 2 and Figure 7). Females (and in some measurements males) are slightly larger than birds from Victoria, New South Wales and South Australia (see Table 4).

Primaries in Adults

The first or outermost primary is usually tipped black and is black over most of the lower basal portion of the feather. In some birds a white tip is followed by a black bar. There is a long white mirror the full width of the feather near the tip (see Table 1) and a white tongue at the base of the feather on each web. The shaft is in most cases black through the black portions of the feather and white through the white.

The second primary is similar to the first, usually having a black tip and a large, white, subterminal mirror. The tongue is more extensive on both webs, being broader and longer (often one-third to half the length of the feather). The shaft is black in the small black portion near the tip and the remainder, in most cases, white.

The third primary is usually tipped white, followed first by a black bar, then by an irregular-shaped white mirror often continuous (especially on the outer web)

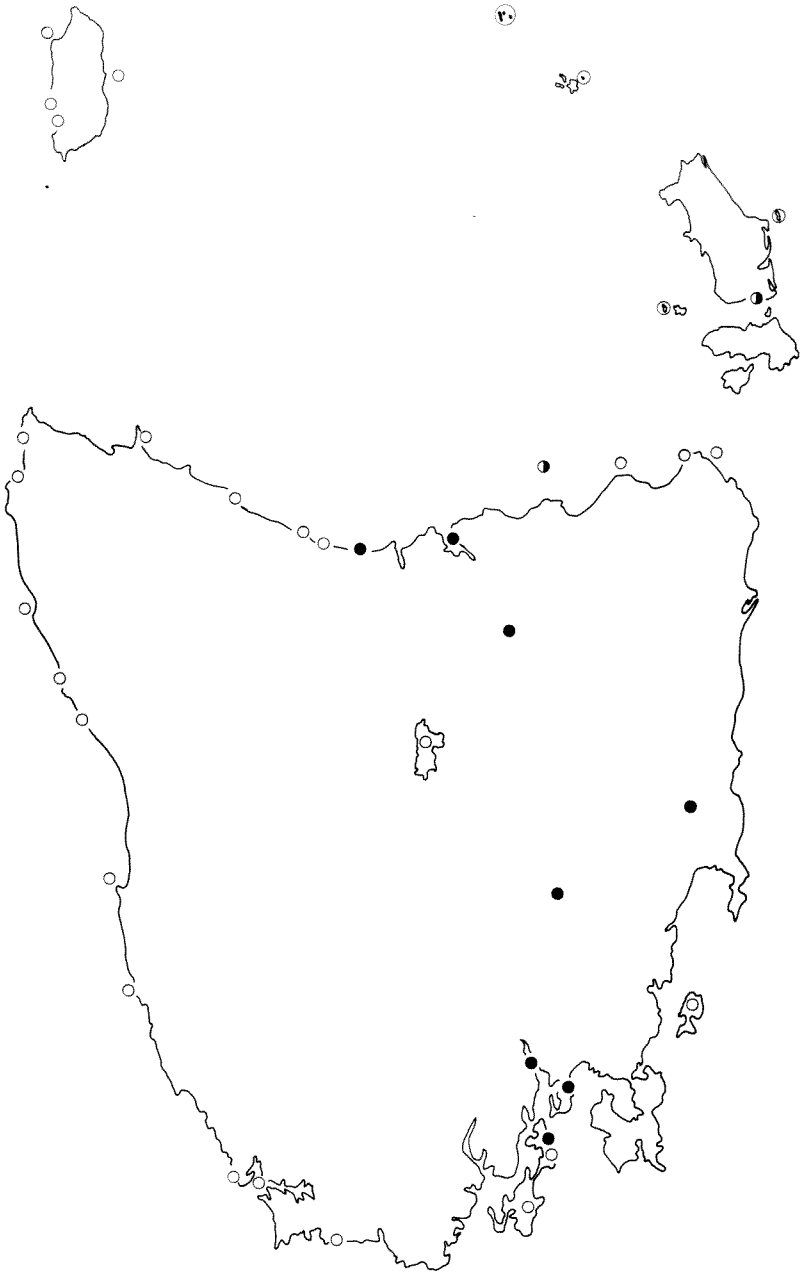

Figure 2 Map of Tasmania, King I. and Furneaux Group, showing location of breeding sites (circles) and specimens studied (dots).

with the broad, long white tongue (see Table 3). The shaft is white except through the black tip.

The fourth primary has a white tip, a black bar and black inner margin grading into grey and white on the outer web. There is less terminal black than in mainland birds; length of black averages 25 mm in males and 24 mm in females, compared to 33 mm and 32 mm in Victorian birds (see Table 3).

The fifth primary is similar to the fourth but the grey portion is decidedly greater. The remaining primaries are grey, slightly darker than the secondaries, with a blackish margin near the tip on the inner web (most noticeable on the sixth); the shafts are also grey.

Compared to other Australian populations Tasmanian birds are easily recognized by their large wing mirrors, with the mirror on the third primary often confluent with the white tongue. One adult male from Trumpeter Bay, Tasmania, has continuous white (i.e. tongue joins mirror) on first, second and third primaries, resembling closely the wing pattern of *Larus bulleri* of New Zealand.

Non-adult Plumages

Downy chicks are mottled buffy-grey to blackish-brown above and whitish-grey below. Young up to six months of age have small mirrors on the first and second primaries, and extensive light brown markings on the wing coverts and secondaries. They also have blackish-brown subterminal bars on all but the outer tail feathers. Immatures eight to ten months old still retain some brownish markings on the wings; the mirrors on the first three primaries are smaller than in adults (in some specimens there is no mirror on the third); the remaining primaries and the secondaries have broad blackish-brown subterminal bars.

Unfeathered Parts

In young up to six months of age, the bill is described on labels as black, the iris blackish-brown and the legs grey. In immatures the bill is red-brown (darker terminally) and the iris dark to white. Adults have the bill described on labels as red, vermilion-red or orange-brown; the iris white; the orbital ring red; the legs and feet cadmium red, red or orange-brown.

Movements

Two banded Tasmanian birds have been recovered in South Australia 950 km to the north-west. Tasmanian birds have been collected in Victoria and New South Wales.

(2) New South Wales

The Silver Gull is common in coastal New South Wales and is found on many islets and lakes along or near the coast. The breeding distribution in New South Wales is mapped in Figure 3.

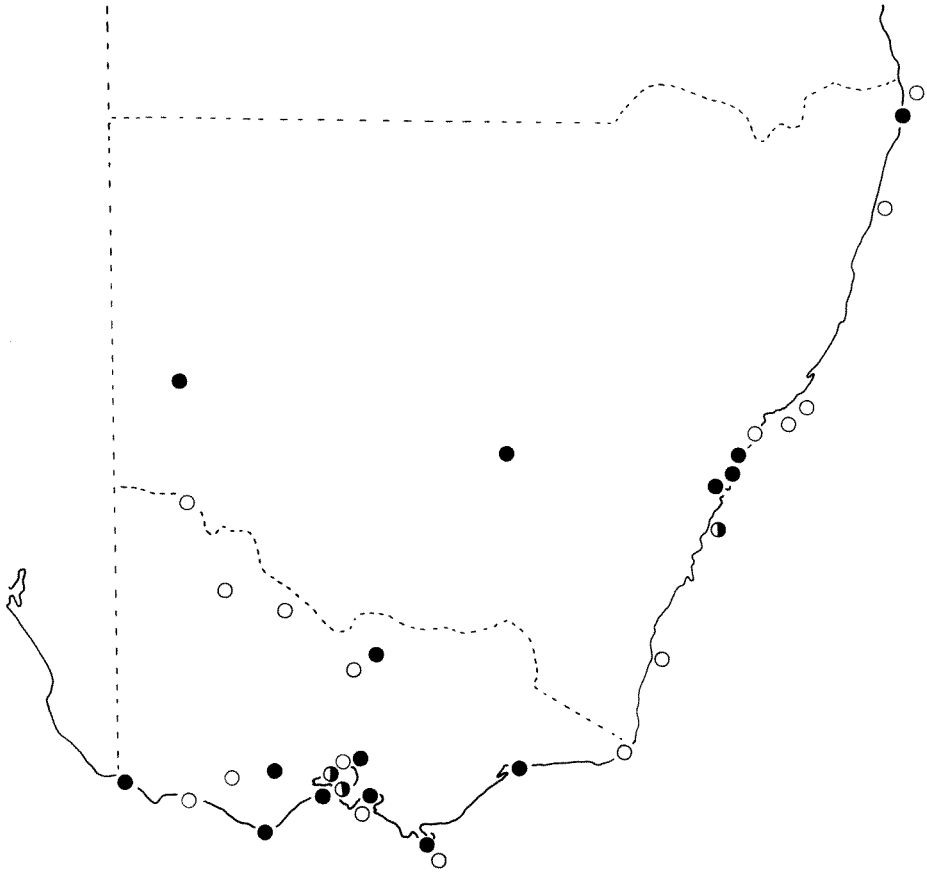

Figure 3 Map of New South Wales and Victoria showing location of breeding sites (circles) and specimens studied (dots).

In size, birds from this region match fairly well with Tasmanian specimens (see Table 4), but on average are slightly shorter in the bill in both sexes. In coloration, birds from New South Wales differ from Tasmanian birds in having reduced white on the first four primaries, in both the mirrors and the tongues.

Primaries in Adults

The first primary has little or no white tongue, and the mirror is often margined with black on the inner web. The second primary also has a narrow reduced white tongue (compared to Tasmanian birds) occupying a third to a half the length of the feather, and the mirror is often margined with black on the inner web. The third primary has a longer and broader white tongue (over half the

length of the feather) than the first and second, but this is still shorter than in Tasmanian birds.

No New South Wales specimen has the tongue meeting the mirror on the third primary as in many Tasmanian birds. The mirror on the third primary is in most cases oval-shaped or a spot, margined on both webs with black. It is absent in three out of eight adult males (all three from the Sydney area) and in one adult female from Byron Bay. It is also reduced in several other females, being absent on the outer web in six out of eleven specimens and on the inner web in three out of eleven. The fourth primary has a shorter white tongue than in Tasmanian birds.

It is of interest that the specimens with reduced white on the primaries are all from north of Sydney, indicating a decline in the number of mirrors and the extent of the white tongues from south to north (see Discussion).

Two specimens in the Australian Museum (030270 from the Grant collection labelled Sydney Harbour, and 042134 from near Sydney) have wing patterns of Tasmanian birds. The second specimen is possibly a migrant from Tasmania, but the first (like much Grant material) is probably mislabelled.

Unfeathered Parts

These are similar to Tasmanian birds, except for some specimens with a dark reddish-black tip to the bill.

Movements

Birds banded in New South Wales have been recorded in Queensland, Victoria and the Northern Territory. In New South Wales banding has shown that there is an average dispersal of young gulls in their first summer for about 400 km northwards from the breeding colonies, with some travelling up to 800 km northwards. A few birds move south for varying distances up to 370 km but the main trend is northward. After the first winter there is much less movement with no recoveries more than 400 km from the place of birth, and the majority of recoveries and observations are within 80 km.

The movement in New South Wales is nearly entirely coastal, in contrast to Victoria and South Australia where many birds move inland. Some New South Wales birds do occasionally move inland as indicated by a bird from Five Islands which was recovered on Mt Ebenezer Station (160 km south-west of Alice Springs) in the Northern Territory.

(3) **Victoria**

The Silver Gull is common along the Victorian coastline and is more widely distributed inland than in any other State. The breeding distribution is mapped in Figure 3.

Many adult specimens from Victoria, New South Wales and South Australia have varying amounts of grey on the head and nape. In size and coloration Victorian birds match most specimens from New South Wales, but have on average, a little more white on the third primary (see Table 3).

Primaries in Adults

Eight out of the ten adults studied have large mirrors on the first three primaries. One adult male and one female show no trace of a mirror on the third primary. Three out of six females studied have the mirror on the second primary margined with black.

The white tongue at the base of the first primary occupies up to one-third the length of the feather (on both webs); just over one-third the length on the second primary; and up to two-thirds the length on the third.

Unfeathered Parts

These are similar to New South Wales and Tasmanian birds, but no adults were noted as having dark tips to the bill. Most were recorded as scarlet.

Movements

As in New South Wales there is a general dispersal of young gulls of one to two years old in all directions to over 1200 km from the birthplace. There is then a retraction of birds back towards the birthplace and most recoveries of birds over two years old are within 80 km of their birthplace. A substantial proportion of young gulls do, however, remain permanently at their place of birth. Banded Victorian birds have been recovered in Tasmania, South Australia and New South Wales. There are very few recoveries of banded Victorian birds form Tasmania, so it appears that there is little movement across Bass Strait. Unlike New South Wales where the main movement is northwards along the coast, most Victorian populations breed inland necessitating southward, eastward or westward movements to reach the coast hence the more varied dispersal.

(4) **South Australia**

In South Australia the Silver Gull is common along all coasts and on offshore islands. Apart from coastal areas, it breeds in the interior as far inland as Lake Eyre. As in Victoria this gull is part of the farming scene, birds following the plough and frequenting piggeries, slaughter yards and rubbish tips.

The breeding distribution in South Australia is mapped in Figure 4.

In size and coloration birds from South Australia are similar to Victorian birds but have slightly less white on the third primary.

Primaries in Adults

Six out of eight adult males and three out of eleven females have reduced mirrors on the third primary (compared to Victorian specimens), the outer web being black. One adult female has no mirror at all. The white tongue at the base of the first three primaries also matches well with Victorian birds; on the first the tongue is short (usually less than one-third the length of the feather, in most cases on both webs); on the second the tongue is over one-third the length of the

Figure 4 Map of South Australia showing location of breeding sites (circles) and specimens studied (dots).

feather on both webs; and on the third primary it is over half the length of the feather.

As mentioned, South Australian birds are similar to Victorian birds, but there is a sharp contrast between them and the easternmost breeding population in Western Australia (Archipelago of the Recherche). The South Australian specimens are larger than the latter and have longer bills and much more white on the third primary (see Tables 3 and 4).

Unfeathered Parts

In young birds the bill is described as black or dark yellow with a black tip; the legs and feet dark yellow, yellow-brown or brownish. In adults the bill is red,

deep dull red, dark red, orange-red, red with dark tip, red tipped with black, or orange with a black tip. The orbital ring is red the legs and feet are red, deep dull red, orange-red or dull orange; and the iris is white.

Movements

Birds banded in South Australia have been recovered in Victoria, New South Wales and Tasmania. In April 1979 two specimens were collected from a flock of 25 at Lera Waterhole (Gregory Salt Lake), Western Australia, which are in measurements and coloration most like South Australian birds and probably came from there. The back and wings are darker grey than in Western Australian birds and the shape and size of the mirrors match South Australian specimens. Small flocks of Silver Gulls were again recorded on Gregory Salt Lake in June 1980. A specimen collected at Newman, Western Australia, in November 1981 also matches best in coloration with South Australian birds. As the Western Australian populations are fairly sedentary and almost strictly coastal, many inland records from that State (Pilbara, Nullarbor Plain, Eastern Goldfields and Wheat Belt) are probably visitors from South Australia.

(5) **Archipelago of the Recherche**

The Archipelago of the Recherche contains the easternmost breeding population in Western Australia. The break between this and the westernmost breeding colony in South Australia is over 1000 km. The breeding distribution in Western Australia is mapped in Figure 5.

Birds from the Archipelago of the Recherche are the smallest in Western Australia, especially in wing, bill and weight measurements (see Table 4). They have smaller primary mirrors (particularly the third) than South Australian specimens or those from the Albany to Perth region. All five specimens collected in December 1979 (the other two are old specimens) had a rosy tinge on the breast and flanks. This faded soon after death, but it has not been observed in any other western population or referred to in any eastern birds. A rosy tinge to the plumage is, however, recorded for the New Zealand race of the Silver Gull *Larus novaehollandiae scopulinus* and for the closely related Black-billed Gull *Larus bulleri,* also of New Zealand.

Primaries in Adults

The white mirrors on the first two primaries are only slightly smaller than in populations 6 and 7 (birds from Albany to Houtman Abrolhos); however, the third primary has no mirror or a greatly reduced mirror. The two adult male specimens from the area have no white on the outer web of the third primary and only a narrow strip of white enclosed by black on the inner web. Of five adult females only one has a white mirror on the outer web of the third primary (four birds having the outer web all black), and only two out of five have a white mirror on the inner web of the third primary (three having the inner web black). Six out

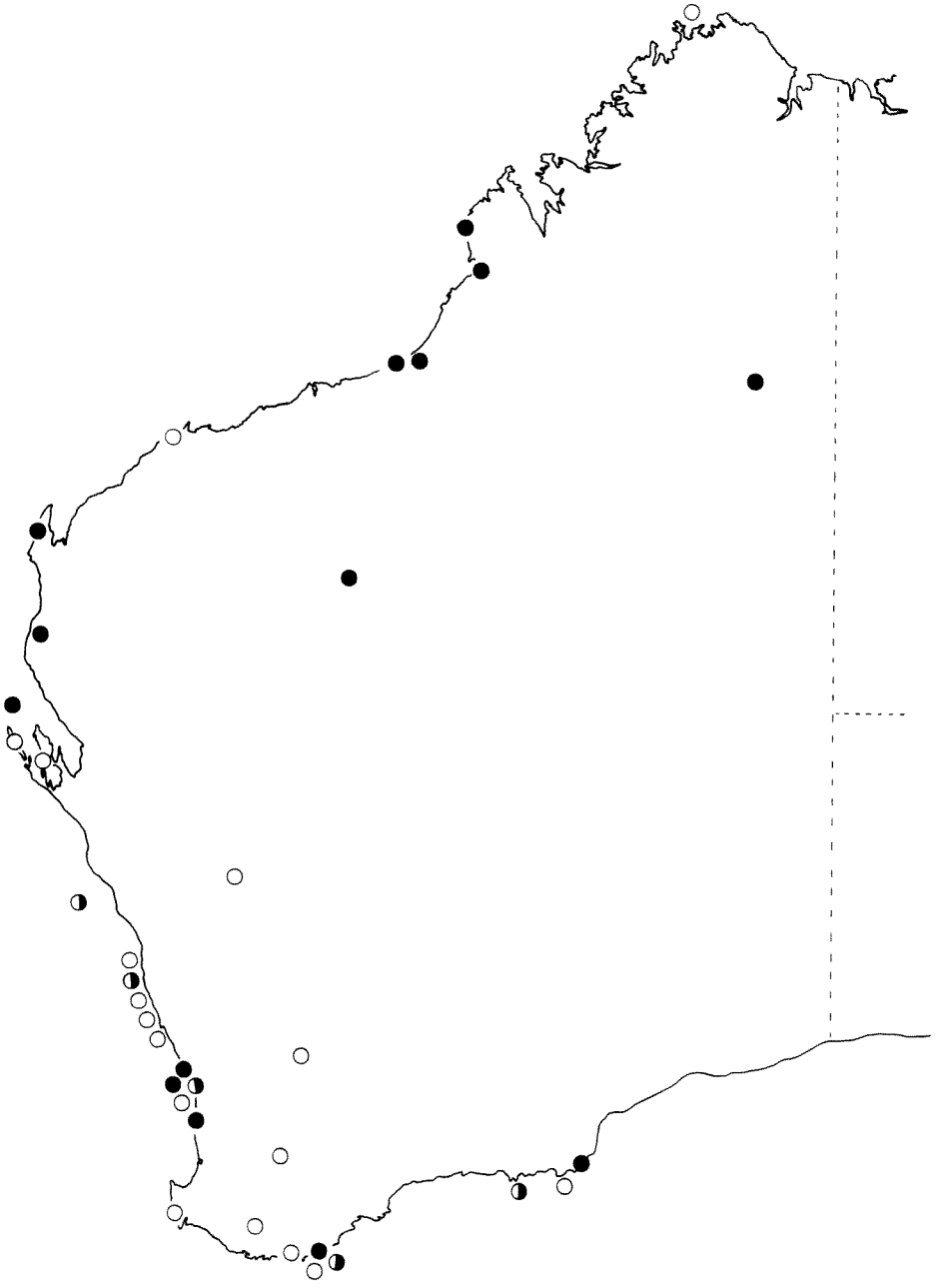

Figure 5 Map of Western Australia showing location of breeding sites (circles) and specimens studied (dots).

of seven birds have no mirror on the outer web of the third primary, and three out of seven no white mirror on the inner web. An adult male collected near Cape Arid on the mainland has no trace of a mirror on the third primary matching most island females.

The basal white tongues match specimens from Albany to Houtman Abrolhos, being long and broad and not reduced as in the north-western populations, which also have small or only two mirrors.

Unfeathered Parts

The bill is maroon, orbital ring red or bright red, legs and feet maroon, iris white and mouth bright red.

Movements

Based on the male collected near Cape Arid it appears there is some movement of birds between the Archipelago of the Recherche and the mainland. Silver Gulls commonly seen at Esperance have not been studied.

(6) **Albany to Perth**

The Silver Gull is common on south-western coasts. It is far more sedentary in Western Australia than in any other State, specially New South Wales, Victoria and South Australia. Occurrences inland are also much rarer than in other States. In the Perth to Fremantle area (where this species is in plague numbers) they ascend the Swan River only as far as Guildford (27 km) and are absent from many near-coastal lakes south and north of the Swan River. Although gulls have been seen on several large inland lakes such as Lake Grace, Lake Dumbleyung, the Wagin lakes, and at Northam and Rawlinna, no specimens are available from these areas and, as at the Gregory Salt Lake, the birds could be visitors from south-eastern Australia. The only permanent inland breeding colony is one of about 40 pairs that nest on islets in Lake Muir in the south-west of the State.

Specimens from the Albany to Perth region are larger than Recherche birds (see Table 4). Compared to South Australian birds, specimens from this area have slightly less white on the mirrors, and south-western females have shorter bills.

Primaries in Adults

Five out of nine males have no mirror on the outer web of the third primary, and in three others the white is narrow; five have all black inner webs, and in two others the white is very narrow. Two out of six females have no mirror on the third primary, and in the other four the white is narrow.

Nearly all the specimens with only two or greatly reduced mirrors are from the northern part of this region, the Perth area. A small proportion of breeding specimens from Carnac I. (near Perth) have only two mirrors, and some individuals have just a faint white spot on the third primary. Along the west coast it is within

this and the following population that the change from three to two mirrors occurs.

The white tongue on the first primary is short and narrow; on the second longer and wider (up to half the length of the feather on both webs); and on the third long and broad (to almost two-thirds the length of the feather on both webs) (see Figure 7).

Non-adult Plumages

Birds five weeks old have the entire underparts white; the face and crown grey, with a blackish-brown spot in front of the eye; head grey; cheeks whitish; mantle, back and wing coverts light grey to greyish-white, each feather with a subterminal blackish-brown band (darkest on wings) and fringed pale reddish-brown. The primaries are black with small mirrors on the first and second. The secondaries have black subterminal bars. The rump is light bluish-grey, and the tail white with blackish-brown to buff subterminal band on all but the outer two rectrices. At five weeks they still have traces of brown on wings and tail. The tail band is lost first, then the speckled coverts and finally the black bar on the secondaries. Adult plumage is attained in 10 months.

Unfeathered Parts

Adult breeding specimens from Carnac I. have the bill red, dark maroon with tip tinged black, orange-brown with blackish-brown tip, brick-red with reddish-brown tip or maroon to brick red with tip tinged brown. The iris is white. The orbital ring is reddish-orange, orange or orange-yellow. The mouth is orange or reddish-orange. The legs are brick-red, dark reddish-brown, reddish-brown, reddish-orange or orange-yellow.

Nicholls (1964) noticed that in her captive colony the adult birds showed a waxing and waning in the coloration of the bill, legs, feet, mouth and eyelids, with peaks in late autumn and mid-spring. This is consistent with the breeding pattern on Carnac I. which Wooller and Dunlop (1979) have shown to be trimodal with peaks in autumn (March to May), winter (June) and spring (September to November).

In immature birds the iris is dark brown; orbital ring greyish-black; legs grey; basal half of bill greyish-brown, the rest blackish-brown; and the mouth pink.

Movements

The largest populations of Silver Gulls in Western Australia occur near Perth and Albany, but there appears to be less movement along the south coast than along the lower west coast. Despite large numbers banded in Western Australia, none have been recovered in any other State. The longest recorded distance travelled by a banded bird is of one ringed near Perth and recovered at Busselton, 195 km to the south. Young birds banded on Carnac I. have been recovered breeding on Seal I., Lancelin I. and Rottnest I. There is little evidence supporting

the view of Serventy *et al.* (1971), that there is a mainly southern movement in this State. In fact the above-mentioned birds recovered on Lancelin I. show the opposite trend. Furthermore I have seen no birds from south of the Houtman Abrolhos that could be ascribed to populations to the north. Banding records combined with geographic variation indicate that there is local movement up to about 200 km along the coast. As mentioned earlier, movements inland seem to be on a still smaller scale.

(7) Fisherman Islands to Houtman Abrolhos

In size and coloration this population is generally similar to population 6 (see Tables 1, 2, 3 and 4). There is a slight increase in the amount of white on the first two mirrors, but a slight decrease in the amount of white on the third mirror, it being more deeply enclosed by black.

Primaries in Adults

In one of three males the mirror on the third primary is not present on the outer web, and in the other two males the white mirror is narrow (enclosed by black) on both webs. One of four females has no mirror on the third primary, and in the other three the white is very narrow on both webs.

Unfeathered Parts

These are as in population 6.

(8) Shark Bay to Exmouth Gulf

Primaries in Adults

Specimens from this region (Dorre I., Lake MacLeod and Mangrove Bay) show a marked decrease of about 20 mm in the size of the mirror on the first primary on both webs. In females there is no overlap in the size of the mirror with population 7, and in males very little overlap (see Table 1 and Figure 7). On the second primary the mirror is similarly 20 mm shorter than in population 7. The third primary has no white mirror, and no specimens from Lake MacLeod northwards in Western Australia have any trace of a white mirror on this feather.

The white tongues on the primaries, particularly on the second and third, are also reduced. On the first primary there is a little white at the base or no white at all; on the second it is on both webs but narrow and under one-third the length of the feather; and on the third it is a little longer and wider but less than half the length of the feather (see Figure 7).

The length of black on the fourth primary is greater than in population 7, but it compares well with more northern birds (see Table 3).

Unfeathered Parts

These are similar to populations 6 and 7.

(9) **Barrow Island to Broome**

The Silver Gull is generally scarce along the Pilbara and Kimberley coasts but is locally common in these regions about coastal towns and ports and at breeding colonies of Brown Boobies and Lesser Frigate-birds (Bedout I. and Lacepede Is). There are few records from northern coasts fringed with mangroves, the gulls preferring the sandy beaches.

Specimens from this region match well with population 8, but females have a slightly longer bill than elsewhere in the State (see Table 4).

Primaries in Adults

There is a slight decrease in the size of the mirrors on the first two primaries. The inner webs of both are usually fringed with black. As in population 8 there is no mirror on the third primary and the white tongues are short.

Unfeathered Parts

The bill is red with a blackish-brown tip, iris white, orbital ring grey-brown, legs deep red and mouth red.

Movements

In both the Pilbara and Kimberley this species is almost purely coastal and rarely wanders more than a few kilometers inland. Storr (1980) gives the status of the Silver Gull in the Kimberley as very common at certain ports (Broome, Cockatoo I., Koolan I.); uncommon elsewhere.

Breeding probably occurs on the Lacepede Is but at present the only known breeding locality in the Kimberley is Jones I., but this island is possibly not currently used, for gulls are scarce in this area and there are no other breeding records since 1901. The main Kimberley population is centred around the Lacepede Is. There is thus a huge break in the breeding range from south-west Kimberley to the north coast of the Northern Territory.

(10) **Northern Territory**

According to Storr (1977) the Silver Gull occurs along northern coasts and islets including Melville I., Goulburn Is and Groote Eylandt. It is locally common, e.g. on Groote Eylandt, but is generally uncommon. It favours blue-water seas off rocky and sandy coasts and islands. Breeding is recorded on Haul Round I. and in Melville Bay.

Only five specimens are available from this area, and on measurements and coloration they appear not to be visitors from elsewhere and are probably resident birds. They match better with specimens from north Queensland than Kimberley.

Primaries in Adults

The mirrors on the first two primaries are slightly larger than in Kimberley birds, and the two males have a small white spot or small mirror on the inner web

of the third primary. On one specimen the spot on the third primary is only present on one wing.

The white tongue on the first primary is short and narrow and only on the extreme base of the feather. On the second primary the tongue is over one-third the length of the feather and on the third over half the length of the feather. On both the second and third the tongues are narrow, especially on the inner web.

Unfeathered Parts

The bill is recorded as dark scarlet, dull scarlet, dull dark red, or blood-red. The iris is white or ash grey. The orbital ring scarlet-orange. The legs scarlet-orange, pale scarlet, orange-red or blood-red. The tip of the bill is not recorded on any specimens as being darker than the base as in most Western Australian populations.

Movements

The Northern Territory population appears to be sedentary with some local movement away from the coast to outer islands especially in the breeding season. This area could also expect migrants from south-eastern Australia (particularly South Australia); which could be distinguished by their three large wing mirrors.

(11) **Queensland**

The Silver Gull is fairly common along the Queensland coast as far north as Cairns. Gulls are occasionally reported well inland, particularly after cyclones. Storr (1973) gives the range of *Larus novaehollandiae forsteri* in Queensland as northern and mid-eastern coasts and islands, south to Mackay and Lady Elliot I.; and the nominate subspecies as south-east coast, estuaries, and islands, north certainly to Bribie I., and in the western and southern interiors. The breeding distribution in Queensland is mapped in Figure 6. There are two large breaks in the breeding range. (1) between Cook Island New South Wales and the Bunker Group (Queensland) a distance of about 470 km, and (2) between Holbourne I. and the Low Is, a distance of 450 km.

Six of the 17 specimens available from Queensland are probably migrants from New South Wales, having three large mirrors or in the case of immatures larger mirrors than Queensland birds of the same age. In all, only ten adults were studied that probably came from the Queensland breeding population: two from Litel I. (Torres Strait), three from Purangi I. (Cape York), one from Tukna Creek (Cape York), two from the Endeavour River, one from Mt Inkerman and one from near Sarina.

Primaries in Adults

The Queensland birds match well with Northern Territory specimens. They have less white on the primaries than most New South Wales birds but more than Kimberley birds. One Queensland male has a small white spot on the outer web of the third primary and only two have small white spots on the inner web. The

basal white tongues are slightly narrower and shorter than in Northern Territory specimens.

An immature female from Rennell I. (Torres Strait) has a small white spot on the outer web of the first primary and on both webs of the second primary.

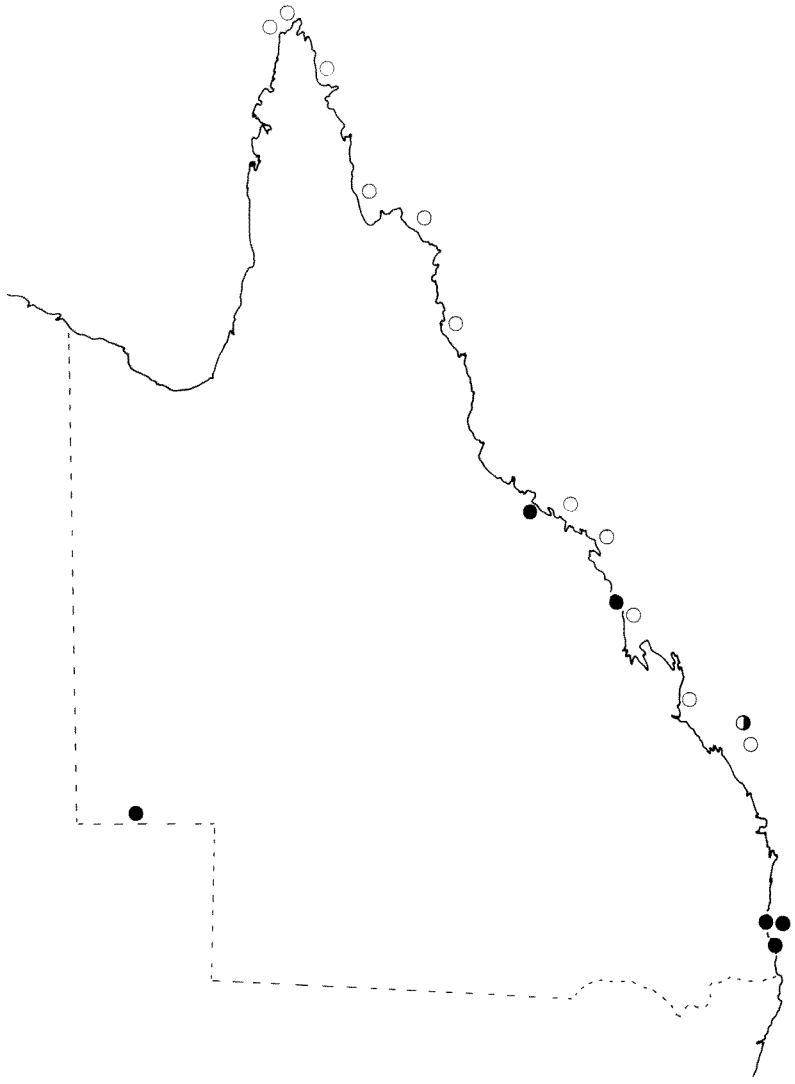

Figure 6 Map of Queensland showing location of breeding sites (circles) and specimens studied (dots).

Unfeathered Parts

Queensland specimens have the bill described as purplish-red or vermilion red, the iris pale grey or chrome yellow and the legs scarlet or vermilion red.

Movements

Little is known about the movements of Queensland birds. The similarity in colour pattern and size between Northern Territory and Queensland birds suggests that the Northern Territory has been colonized from Queensland.

(12) **New Caledonia**

An adult male from New Caledonia is the only specimen examined from within the range of *forsteri* (*sensu stricto*). Usually Queensland and coastal Northern Territory birds are placed in *L. n. forsteri* (type locality New Caledonia). However the single specimen examined from New Caledonia differs from all adult Australian birds in having only one wing mirror. It also has a greyish crescent on the nape and broad white tips on the second, third, fourth, fifth and sixth primaries. The mirror on the first primary matches well with north Queensland specimens in size and shape. The second primary is a new feather and shows no trace of a white mirror, nor does the third primary which is also new. Judging from this specimen and Mathews' (1912) description of *forsteri* the New Caledonian birds have much less white on the primaries, and in this respect differ markedly from Queensland birds.

Further collecting within this region is necessary for clarifying the status of *L. n. forsteri.*

(13) **New Zealand**

The Red-billed Gull (*Larus novaehollandiae scopulinus*) occurs on North and South Islands, and on Three Kings and Chatham Islands, Stewart, Great, Little Barrier, Kapiti, Snares, Auckland and Campbell Islands. It is a straggler to the Kermadec Islands. It is very common along the coasts, especially about harbours, but is also found on inland lakes, breeding inland at Rotorua. Mills (1969) maps the breeding distribution in New Zealand.

New Zealand birds are smaller than those from all Australian populations (see Table 4), especially in wing and bill measurements. Most of them have only two mirrors, which are smaller than in Australian birds (see Tables 1, 2, 3 and Figure 7), and the mirrors run out on the inner web at right angles to the feather shaft (the angle is more acute in Australian birds).

The basal white tongues on the first three primaries, especially the third, are longer and broader than in most Australian populations. In this respect they differ markedly from Hartlaub's Gull of Africa, which also has only two mirrors but greatly reduced tongues. Several New Zealand specimens show a faint greyish tinge to the nape, and Buller (1888) mentions that some birds in nuptial plumage have the breast and sides suffused with a delicate roseate tint. The white mantle

Figure 7 Typical wing patterns of adult Silver Gulls from (left to right) New Zealand, Tasmania, Victoria, Archipelago of the Recherche, Albany to Perth and Shark Bay to Exmouth Gulf.

merges into the pale grey back. The back and wings are pale grey or blue-grey as in Australian birds, and in most specimens are lighter than in Hartlaub's Gull.

Primaries in Adults

The first primary has a short to moderately long white tongue, usually on both webs but longest on the inner web (up to just over one-third the length of the feather). The white mirror runs out on the inner web at right angles from the shaft (see Figure 7). The rest of the feather is black except for a white tip in specimens showing no wear.

The second primary has a broad white tongue, longest on the inner web and up to half the length of the feather. The outer edge of the tongue is occasionally margined with black. The mirror again runs out from the shaft at right angles on the inner web (on the outer web the angle is more acute). The tip is white in unworn plumage.

The third primary has a long broad white tongue up to two-thirds the length of the feather. The tongue is edged on the inner web with greyish-white or greyish-black. The rest of the feather in 12 out of 14 specimens is black, i.e. lacking a mirror but tipped white in unworn plumage. Two adults, one from Lower Hutt (No. 13384) and the other a male from Stewart I. (No. 15227), have a fairly large white spot or small mirror on the inner web of the third primary. Although the nominate form has been recorded in New Zealand, the above specimens are certainly not Australian, for they have the square-cut mirrors on the first two primaries characteristic of *scopulinus*. Oliver (1930: 267) depicts a bird from Kapiti I. with three primary mirrors.

The fourth primary has a white tongue on the outer web. The inner web is grey and white margined with black the rest of the feather is black except for a white tip in unworn plumage.

Unfeathered Parts

The bill is dark red, lighter on the ridge and towards the tip, iris silvery white, orbital ring red, and legs and feet red.

Movements

No New Zealand birds have yet been found in Australia. Dwight's (1925) records of the Australian form as casual in New Zealand could be based on the odd New Zealand bird with three primary mirrors. At any rate they are not accepted by the Checklist Committee of the Ornithological Society of New Zealand (1970).

Variation in Hartlaub's Gull

Hartlaub's Gull (*L. hartlaubii*) breeds on islands off south-western Africa from Walvis Bay south at least to Cape Agulhas (Clancey 1964). It favours the cold

coastal waters of western South Africa but ranges occasionally as far east as Natal.

Hartlaub's Gull has long been treated as a race of the Australian Silver Gull. African birds are smaller and darker than all Australian populations and match best in size with New Zealand birds. They average slightly longer in the wing than New Zealand specimens and have longer and narrower bills. The upper and under wing and the back are darker grey than in Australia and New Zealand.

Primaries in Adults

Most *L. hartlaubii* have only two white mirrors in the wing (two females have a small white spot on the inner web of the third primary), and the mirrors average smaller than in New Zealand specimens (see Tables 1, 2, 3 and 5). The basal white tongues on the first three primaries are much shorter and narrower than in all populations of *novaehollandiae.*

In 15 of 18 adult *hartlaubii* there is no white tongue at the base of the first primary, and in the two that have a short tongue it is greyish-white rather than white. The mirror on the first primary is in most specimens margined with black on the inner web.

On the second primary the tongue is longer (up to half the length of the feather) on the outer web. On the inner web the tongue is absent or greatly reduced and is often only present as a greyish-white line along the shaft. The mirror is broadly margined with black on the inner web in 12 out of 18 adults.

The third primary has a long white tongue on the outer web, usually about half, but up to two-thirds the length of the feather. Where present on the inner web the tongue is narrow (1-4 mm wide) and merges with the grey (in other words scarcely crossing the shaft on to the inner web). In 16 of 18 adults there is no mirror on the third primary. The exceptions are two females (one from Port Nolloth, the other from Berg River); which have a small white spot on the inner web of the third primary.

The fourth primary has a long white tongue on the outer web. On the inner web the tongue is reduced to a thin greyish-white line running along the shaft and widening near the end. The black on the inner web is in most specimens more extensive than in Australian and New Zealand birds; i.e. there is less grey or white. In this character some *L. hartlaubii* match with Grey-headed Gull (*L. cirrocephalus*); however the amount of black is variable, some specimens having a fairly broad greyish area on the inner web.

In several other characters *L. hartlaubii* is more like *L. cirrocephalus* than *L. novaehollandiae.* The white mantle in adult *hartlaubii* and *cirrocephalus* is well defined and contrasts sharply with the dark grey back (in *novaehollandiae* the white mantle grades into the light grey back). Breeding *hartlaubii* assume a grey bar on the nape that commonly extends to the side of neck and less frequent across the throat. This collar is usually most distinct on the hind neck. It is here

that the dark hood of *cirrocephalus* meets the white of the neck and it is here that the margin of the hood is darkest.

Unfeathered Parts

The bill is cherry red (3), reddish-black (3), reddish-brown (2), flesh (1). The iris is brown (10), greyish-brown (4), yellowish-brown (2). The orbital ring is red (2), dark maroon (1), cherry red (1). The legs are red (6), cherry red (2), brownish (2), reddish-brown (1), tan brown (1), flesh (1), black (1).

Variation in the Grey-headed Gull

The Grey-headed Gull (*Larus cirrocephalus*) is divided into two subspecies, separated by the Atlantic Ocean. The nominate subspecies occurs in South America north to Ecuador and north-eastern Brazil, and *L. c. poiocephalus* in Africa (north to Gambia and Ethiopia) and Madagascar. On both continents it occurs on fresh waters and coasts.

The African subspecies *L. c. poiocephalus* is smaller than the nominate form and has smaller mirrors (see Tables 5 and 6). The mantle is purer white and well demarcated from the back, rather than being tinged with grey as in many South American specimens.

Grey-headed Gulls differ from Hartlaub's Gull in their larger size, more extensive grey on the head (even in immature and non-breeding plumages), smaller mirrors on the first two primaries and less white or greyish-white on the fourth primary. The iris is yellow in most *cirrocephalus* and brown in most *hartlaubii*. The Grey-headed Gull favours fresh waters, *hartlaubii* cold coastal waters; though each may be found in the preferred habitat of the other species (Clancey 1964).

Primaries in Adults

The colour pattern of the primaries is much the same as in *L. hartlaubii*. The first primary is black with no trace of a tongue and with a squarish white subterminal mirror, margined with black on the inner web. The second primary is mostly black with a narrow white tongue on the outer web and a small white mirror margined with black on the inner web. The third primary is black, without a mirror and with a moderately long tongue (usually only on the outer web; sometimes a trace of white on the inner web). The fourth primary has a long white tongue on the outer web, the rest of the feather being mostly black but becoming blackish-grey at the base on the inner web. The length of the subterminal black bar on the outer web averages 70 mm in the nominate form and 71 mm in *poiocephalus*.

Unfeathered Parts

The bill is red (3), dark red (2), light red (1), dull crimson (1), dark coral (1), dull red (1) and dark brown (1). The iris is yellow (3), maple yellow (2), light yellow (1), pale (2), white (1), brown (2). The orbital ring is light red (1). The legs

are red (4), light red (1), coral (1), brown (2), dull vermilion (1), dull red (1), dark brown (1).

Movements

Generally the breeding ranges of Hartlaub's Gull and the Grey-headed Gull do not overlap. In southern Africa *cirrocephalus* breeds regularly and in good numbers in the southern Transvaal, and occasionally elsewhere in the interior if conditions are suitable. They disperse widely from their breeding grounds, covering all of South Africa and commonly reaching southern Mozambique and southern Angola in the north.

Hybridization

Each year small numbers of Grey-headed Gulls enter the range of *L. hartlaubii* and occasionally form mixed pairs or pair themselves among breeding *hartlaubii.* Hybridization between *Larus cirrocephalus* and *Larus hartlaubii* has been recorded from time to time (Sinclair 1977), but obvious hybrids are rare in collections. It would be interesting to note the iris colour of a mixed pair, as some breeding *cirrocephalus* have the iris described as brown (rather than yellow) and odd *hartlaubii* have it yellowish-brown (rather than brown). In many gulls unfeathered part coloration and calls play an important part in species recognition and pair bond formation, and it can be seen from the unfeathered part data that some *cirrocephalus* and some *hartlaubii* could match.

Judging from descriptions, the breeding displays of *L. cirrocephalus, L. hartlaubii* and *L. novaehollandiae,* are almost identical.

Table 1 Measurements (mm) of *Larus novaehollandiae* showing the length of the white mirror on the first primary, with means and sample size in parentheses.

First primary			Length of white mirror outer web	Tongue joins mirror Continuous white outer web	Outer web black	Length of white mirror inner web	Tongue joins mirror Continuous white inner web	Mirror inner web enclosed by black
1	Tasmania	♂ (N10)	58-86 (71)	1		53-72 (61)	1	
		♀ (N6)	65-91 (70)			55-74 (61)		
2	New South Wales	♂ (N7)	40-64 (54)			39-55 (48)		
		♀ (N11)	43-76 (62)			29-68 (54)		
3	Victoria	♂ (N4)	42-68 (55)			41-61 (50)		1
		♀ (N6)	53-65 (59)			46-56 (53)		2
4	South Australia	♂ (N6)	43-60 (53)			46-53 (49)		
		♀ (N12)	47-70 (58)			42-65 (52)		
5	Archipelago of the Recherche Western Australia	♂ (N2)	52, 62			44, 45		
		♀ (N5)	53-64 (57)			32-50 (43)		
6	Albany to Perth Western Australia	♂ (N8)	41-64 (55)			23-56 (46)		
		♀ (N5)	40-61 (53)			32-53 (45)		

Table 1 (cont.)

First primary			Length of white mirror outer web	Tongue joins mirror Continuous white outer web	Outer web black	Length of white mirror inner web	Tongue joins mirror Continuous white inner web	Mirror inner web enclosed by black
7	Fisherman Islands to Houtman Abrolhos Western Australia	♂ (N3)	46-71 (60)			41-57 (50)		
		♀ (N5)	55-69 (63)			48-54 (51)		
8	Shark Bay to Exmouth Gulf Western Australia	♂ (N4)	36-50 (41)			31-46 (35)		
		♀ (N4)	28-48 (38)			19-38 (30)		
9	Barrow Island to Broome Western Australia	♂ (N6)	0-51 (31)		1	17-32 (26)		
		♀ (N4)	32-50 (40)			17-36 (30)		
10	Northern Territory	♂ (N4)	47-53 (50)			37-42 (40)		1
		♀ (N1)	37			36		
11	Queensland	♂ (N4)	37-49 (38)			30-39 (36)		3
		♀ (N5)	30-48 (40)			32-46 (37)		4
12	New Caledonia	♂ (N1)	40			41		
13	New Zealand	♂ (N7)	27-56 (44)			31-50 (42)		
		♀ (N3)	31-62 (46)			34-57 (45)		

Table 2 Measurements (mm) of *Larus novaehollandiae* showing the length of the white mirror on the second primary, with means and sample size in parentheses.

Second primary		Length of white mirror outer web	Tongue joins mirror Continuous white outer web	Mirror outer web enclosed by black	Outer web black	Length of white mirror inner web	Tongue joins mirror Continuous white inner web	Mirror inner web enclosed by black	Inner web black
1 Tasmania	♂ (N9)	49-70 (61)	1			45-66 (54)	1		
	♀ (N6)	49-78 (58)				46-63 (51)			
2 New South Wales	♂ (N8)	24-55 (44)				33-48 (41)			
	♀ (N12)	32-59 (49)				28-54 (44)			
3 Victoria	♂ (N4)	33-61 (47)				32-51 (41)		3	
	♀ (N6)	44-60 (50)				40-51 (45)			
4 South Australia	♂ (N7)	37-51 (43)				35-47 (40)			
	♀ (N12)	39-61 (49)				36-54 (43)			
5 Archipelago of the Recherche Western Australia	♂ (N2)	45, 46				39, 39			
	♀ (N5)	37-54 (43)				30-38 (34)			
6 Albany to Perth Western Australia	♂ (N8)	29-55 (46)		1		26-49 (41)		1	
	♀ (N5)	33-54 (45)				30-58 (41)			

Table 2 (cont.)

Second primary		Length of white mirror outer web	Tongue joins mirror Continuous white outer web	Mirror outer web enclosed by black	Outer web black	Length of white mirror inner web	Tongue joins mirror Continuous white inner web	Mirror inner web enclosed by black	Inner web black
7 Fisherman Islands to Houtman Abrolhos Western Australia	♂ (N3)	41-61 (50)				33-44 (40)			
	♀ (N5)	37-60 (48)				34-51 (42)			
8 Shark Bay to Exmouth Gulf Western Australia	♂ (N3)	25-40 (33)				24-39 (29)			
	♀ (N5)	13-38 (27)				15-31 (24)			
9 Barrow Island to Broome	♂ (N6)	0-29 (16)		3	2	0-26 (15)		3	2
	♀ (N4)	21-30 (25)				20-27 (23)			
10 Northern Territory	♂ (N4)	34-42 (36)				29-37 (33)			
	♀ (N1)	26				26		1	
11 Queensland	♂ (N4)	33-42 (38)				30-36 (33)			
	♀ (N5)	20-39 (29)				22-34 (28)		4	
12 New Caledonia	♂ (N1)	0			1	0			1
13 New Zealand	♂ (N7)	0-43 (28)			2	14-41 (31)			
	♀ (N3)	13-43 (29)				22-45 (33)			

Table 3 Measurements (mm) of *Larus novaehollandiae* showing the length of the white mirror on the third primary, and the length of the black subterminal bar on the fourth primary, with means and sample size in parentheses.

Third primary		Length of white mirror outer web	Tongue joins mirror Continuous white outer web	Mirror outer web enclosed by black	Outer web black	Length of white mirror inner web	Tongue joins mirror Continuous white inner web	Mirror inner web enclosed by black	Inner web black	Length of black sub-terminal bar on fourth primary
1 Tasmania	♂ (N9)	21-44 (34)	6			30-49 (38)	3			17-31 (25)
	♀ (N6)	28-40 (36)	3			27-40 (34)	3			21-26 (24)
2 New South Wales	♂ (N8)	0-29 (13)			3	0-32 (15)			3	27-35 (31)
	♀ (N11)	0-34 (12)			6	0-36 (18)			3	25-43 (32)
3 Victoria	♂ (N4)	0-31			1	0-33			1	27-40 (33)
	♀ (N6)	0-34 (24)			1	20-32 (27)				29-33 (32)
4 South Australia	♂ (N8)	0-27 (5)			6	8-25 (17)				25-40 (32)
	♀ (N11)	0-34 (18)			3	0-37 (22)			1	25-38 (31)
5 Archipelago of the Recherche Western Australia	♂ (N2)	0			2	11, 15			2	32, 39
	♀ (N5)	0-25			4	0-16 (5)			3	32-36 (34)
6 Albany to Perth Western Australia	♂ (N9)	0-29 (10)		3	5	0-30 (12)		2	5	29-45 (37)
	♀ (N6)	0-25 (13)				0-31 (15)		4	2	31-37 (34)

Table 3 (cont.)

Third primary			Length of white mirror outer web	Tongue joins mirror Continuous white outer web	Mirror outer web enclosed by black	Outer web black	Length of white mirror inner web	Tongue joins mirror Continuous white inner web	Mirror inner web enclosed by black	Inner web black	Length of black sub-terminal bar on fourth primary
7	Fisherman Islands	♂ (N3)	0-14 (8)		2	1	9-23 (16)		2		30-34
	to Houtman Abrolhos	♀ (N4)	0-27 (17)		3	1	0-21 (14)		3	1	29-42 (36)
	Western Australia										
8	Shark Bay to	♂ (N4)	0			4	0			4	45-54 (50)
	Exmouth Gulf	♀ (N4)	0			4	0			4	41-52 (45)
	Western Australia										
9	Barrow Island	♂ (N5)	0			5	0			5	38-62 (50)
	to Broome	♀ (N5)	0			5	0			5	45-58 (50)
	Western Australia										
10	Northern Territory	♂ (N4)	0			4	0-17 (6)			2	
		♀ (N1)	0			1	0			1	
11	Queensland	♂ (N4)	0-12 (3)			3	0-17 (8)			3	
		♀ (N5)	0			5	0-15 (5)			2	
12	New Caledonia	♂ (N1)	0			1	0			1	
13	New Zealand	♂ (N7)	0			7	0-13 (2)			6	33-42 (36)
		♀ (N3)	0			3	0			3	31-38 (34)

Table 4 Measurements (mm) of *Larus novaehollandiae* with means and sample size in parentheses.

			Wing	Culmen length	Culmen depth	Tail	Tarsus	Length	Weight
1	Tasmania	♂ (N11)	279-309 (293)	48.0-51.0 (49.3)	9.4-10.9 (10.1)	112-121 (116)	45-51 (48)		
		♀ (N6)	268-304 (287)	43.0-47.0 (47.7)	8.4-10.3 (9.2)	108-118 (114)	42-48 (45)		
2	New South Wales	♂ (N7)	282-305 (290)	44.0-49.0 (47.3)	9.6-11.0 (10.2)	108-122 (115)	44-50 (47)	384-415 (400)	246-397 (333)
		♀ (N10)	272-295 (284)	41.5-48.0 (44.6)	8.4-10.0 (9.0)	105-114 (109)	42-49 (45)	368-395 (381)	195-311 (261)
3	Victoria	♂ (N4)	295-306 (301)	46.0-50.0 (47.2)	10.0-10.5 (10.2)	117-127 (121)	47-50 (49)	400-434 (413)	311-350 (338)
		♀ (N6)	271-295 (284)	42.0-45.0 (44.0)	8.2-9.2 (8.8)	107-114 (111)	38-46 (44)	382-429 (399)	220-367 (284)
4	South Australia	♂ (N8)	292-305 (298)	46.5-52.0 (48.2)	8.8-11.2 (9.7)	108-127 (116)	42-52 (49)	418-444 (431)	343-399 (372)
		♀ (N15)	274-310 (286)	41.0-49.0 (46.8)	8.1-10.6 (9.2)	100-126 (113)	43-52 (46)	368-419 (399)	295-340 (310)
5	Archipelago of the Recherche Western Australia	♂ (N2)	290, 291	45.0, 48.0	9.7, 10.0	108, 115	46, 49	380, 402	250, 270
		♀ (N5)	283-289 (286)	41.0-47.0 (43.7)	9.0-10.0 (9.4)	111-119 (115)	44-48 (45)	382-390 (386)	240-310 (267)
6	Albany to Perth Western Australia	♂ (N8)	286-309 (300)	51.0-53.0 (51.5)	9.9-12.1 (10.9)	116-128 (121)	46-51 (48)	372-427 (403)	330-380 (348)
		♀ (N8)	276-305 (288)	43.5-48.0 (45.7)	9.4-10.5 (9.9)	107-125 (114)	42-47 (45)	355-399 (386)	266-368 (307)
7	Fisherman Islands to Houtman Abrolhos Western Australia	♂ (N3)	300-313 (306)	50.0-51.5 (50.8)	10.3, 12.1	110-125 (119)	47-52 (50)	410, 430	335, 340
		♀ (N5)	273-306 (291)	45.0-47.0 (45.8)	10.1-10.7 (10.4)	110-121 (116)	44-48 (46)	380-390 (385)	299-320 (310)
8	Shark Bay to Exmouth Gulf Western Australia	♂ (N5)	301-309 (304)	48.0-56.5 (51.4)	10.0-11.2 (10.7)	116-122 (120)	45-53 (49)	380-425 (404)	350-420 (382)
		♀ (N5)	289-298 (293)	46.0-49.5 (47.8)	9.1-10.0 (9.4)	106-117 (111)	47-50 (48)	386-425 (401)	280-330 (304)
9	Barrow Island to Broome	♂ (N6)	292-319 (305)	49.0-54.0 (51.3)	9.7-10.9 (10.3)	110-127 (120)	51-54 (52)	412, 423	300, 340
		♀ (N5)	281-299 (288)	47.5-52.5 (49.5)	9.1-9.5 (9.3)	103-116 (111)	48-54 (50)	406-413 (409)	260-320 (296)
10	Northern Territory	♂ (N4)	292-296 (294)	47.5-53.5 (50.6)	10.0-10.7 (10.4)	112-118 (115)	50-52 (51)		315-355 (337)
		♀ (N1)	304	44.0	9.5	121	48		340
11	Queensland	♂ (N4)	297-306 (300)	49.5-50.0 (50.6)	10.4-11.5 (10.9)	116-121 (117)	48-52 (50)		
		♀ (N5)	281-293 (284)	46.5-49.0 (47.9)	9.4-10.4 (9.8)	107-115 (110)	44-51 (47)		
12	New Caledonia	♂ (N1)	287	52.0	10.1	108	44		
13	New Zealand	♂ (N6)	258-291 (275)	39.0-44.5 (41.5)	9.6-10.0 (9.8)	100-119 (109)	38-44 (41)		
		♀ (N3)	264-265 (265)	41.0-42.5 (41.8)	8.7-9.3 (9.0)	103-109 (106)	37-41 (39)		

Table 5 Measurements (mm) showing the extent of the white mirrors of *Larus hartlaubii* and *Larus cirrocephalus.*

First primary			Length of white mirror outer web	Mirror outer web enclosed by black	Length of white mirror inner web	Mirror inner web enclosed by black
Larus hartlaubii	♂	(N9)	25-50 (40)		26-41 (34)	5
	♀	(N9)	31-45 (43)		21-38 (29)	7
Larus c. cirrocephalus	♂	(N3)	36-44 (40)		24-38 (33)	3
	♀	(N4)	23-49 (40)		11-37 (27)	4
Larus c. poiocephalus	♂	(N13)	20-40 (32)		17-29 (23)	12
	♀	(N9)	22-39 (30)		16-26 (21)	9
Second primary						
Larus hartlaubii	♂	(N9)	21-39 (27)		19-33 (26)	6
	♀	(N9)	13-34 (26)		11-33 (22)	8
Larus c. cirrocephalus	♂	(N3)	23-39 (31)		9-34 (23)	2
	♀	(N3)	31-37 (35)		22-30 (26)	
Larus c. poiocephalus	♂	(N12)	16-32 (24)	2	7-28 (20)	10
	♀	(N9)	9-27 (20)	1	12-22 (17)	4

Table 6 Measurements (mm) of *Larus hartlaubii, Larus cirrocephalus cirrocephalus* and *Larus cirrocephalus poiocephalus* with means and sample size in parentheses.

			Wing	Culmen length	Culmen depth	Tail	Tarsus
Larus hartlaubii	♂	(N9)	274-291 (283)	45.0-50.5 (47.8)	8.2-9.3 (8.8)	104-114 (108)	39-44 (42)
	♀	(N9)	265-293 (276)	42.0-47.0 (44.5)	7.5-9.4 (8.0)	102-112 (106)	38-43 (40)
Larus c. cirrocephalus	♂	(N4)	313-338 (325)	49.5-56.0 (54.1)	9.9-11.1 (10.5)	116-134 (125)	50-55 (51)
	♀	(N8)	300-328 (312)	48.0-53.5 (49.9)	8.9-9.4 (9.2)	110-132 (118)	44-50 (48)
Larus c. poiocephalus	♂	(N18)	283-330 (313)	46.5-57.5 (52.1)	7.9-10.7 (9.5)	102-124 (117)	44-51 (47)
	♀	(N13)	290-317 (302)	45.0-51.0 (47.4)	8.0-9.9 (8.8)	111-120 (114)	40-48 (44)

Discussion

Most of the variation within Australian Silver Gulls is clinal, e.g. increasing white on the primaries from Queensland to Tasmania and from Western Australia to Tasmania. As expected the cline down the east coast is not smooth due to large breaks in the breeding range. The situation is also complicated by long-distance movements of many south-eastern birds and the lack of specimens from breeding localities. In contrast, the Western Australian populations are far more sedentary

and show a more gradual increase in mirror size and number from north to south (two mirrors in the north, three in the south). The cline along the south coast would also be relatively smooth except for the peculiar population in the Archipelago of the Recherche; these birds are small, have only two mirrors or a greatly reduced third mirror, and in life have a rosy tinge to the under parts.

Using a combination of measurements and coloration the region of origin of most suspected vagrants and migrants can be detected. In Australia, Tasmanian birds appear to be the most distinctive and the name *gunni* is available for them. However, the unnamed populations from the Archipelago of the Recherche and from northern Western Australia (Carnarvon to Kimberley) have diverged at least as far. Nevertheless in view of the predominantly clinal variation within Australia it seems pointless to add names to those already available.

The *Larus cirrocephalus* species group is made up of four species: *L. cirrocephalus, L. hartlaubii, L. novaehollandiae* and *L. bulleri,* and is entirely restricted to the Southern Hemisphere. The evolution of this group could be explained by the following steps: (1) an early form of Southern American *cirrocephalus* invaded South Africa and in isolation evolved into *L. hartlaubii*; (2) an early form of *hartlaubii* spread east to Australia and New Zealand, evolving into *novaehollandiae* in the first region and *bulleri* in the second; (3) Australian *novaehollandiae* subsequently re-invaded New Zealand and evolved into *scopulinus*; (4) recently Southern American *cirrocephalus* re-invaded Africa and evolved into *poiocephalus.*

Conclusion

The following nomenclature for the *Larus cirrocephalus* species group is proposed: *Larus cirrocephalus cirrocephalus* Vieillot of South America, *Larus cirrocephalus poiocephalus* Swainson of Africa, *Larus hartlaubii* Bruch of south-west Africa, *Larus novaehollandiae novaehollandiae* Stephens of Australia and Tasmania, *Larus novaehollandiae forsteri* (Mathews) of New Caledonia, *Larus novaehollandiae scopulinus* Forster of New Zealand, and *Larus bulleri* Hutton of New Zealand.

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Addendum

On 13 October 1982 a female Silver Gull was collected from a flock of 200 at Wyndham, east Kimberley, Western Australia. It has three primary mirrors and the bill was red, slightly darker at the tip. In wing pattern and bill coloration it matches birds from the Northern Territory rather than west Kimberley. Several immature gulls still begging for food were also seen at Wyndham; so it appears that the species breeds in this area.

Received 15 April 1982 Accepted 13 July 1982 Published 13 December 1982