

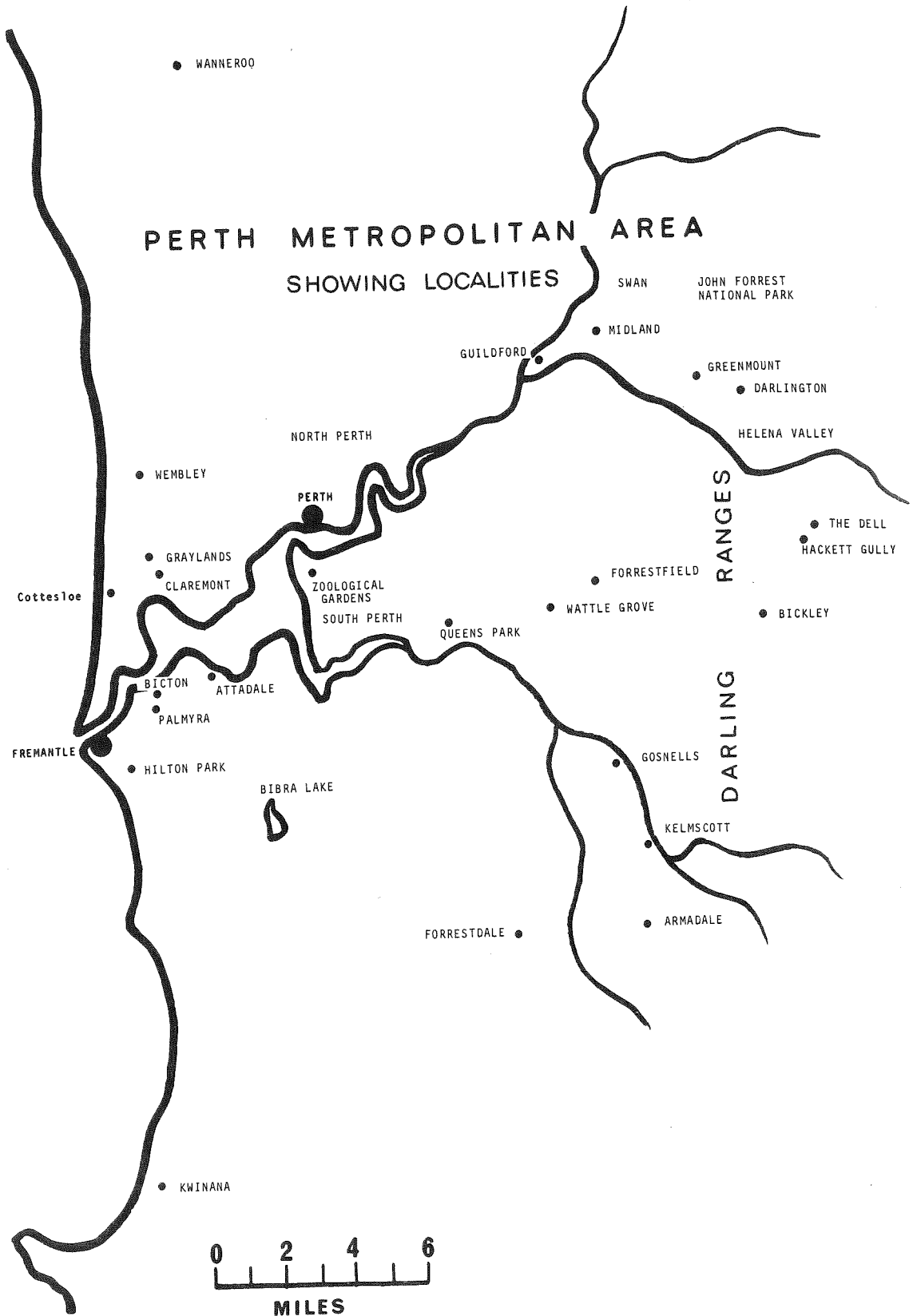
Introduced Birds and Mammals in Western Australia

J. L. LONG



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Protection Board
Australia TECHNICAL SERIES 1.



INTRODUCED BIRDS AND MAMMALS IN WESTERN AUSTRALIA

By J.L. Long

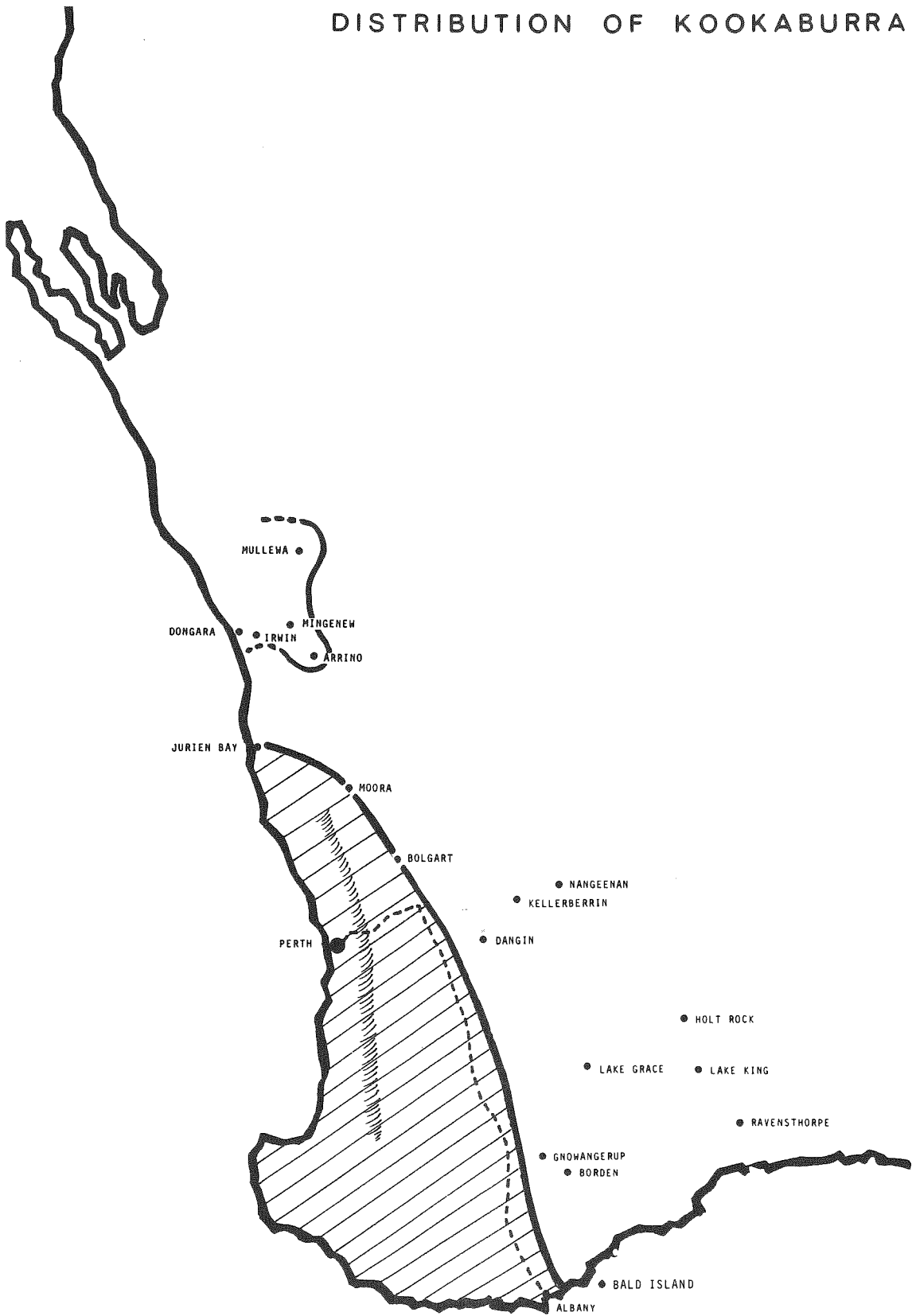
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DISTRIBUTION OF KOOKABURRA



INTRODUCTION

Reliable predictions of the consequences of liberating a species in a place where it has not lived previously are largely impossible. There are many examples throughout the world of introduced or feral mammals and birds becoming liabilities rather than the sporting, aesthetic or economic assets originally intended. Generally those that have become abundant in new areas, such as the rabbit, feral donkey and goat, have become pests.

Introduced species can cause damage to indigenous plant life, compete with native animals for food and shelter, assist in the spread of exotic infectious diseases as well as cause agricultural damage to crops and pastures.

The data presented in this paper gives the history, spread and range of those species known to have been introduced or become feral in Western Australia. Maps have been included for most species showing either spread, distribution, or location of reports. Place names used in the text can be located either on these maps or on the scale map included in the pocket on the inside back cover.

BIRDS

At least twenty seven species of foreign birds have been introduced into the wild in this State. Many more may have been released, but the details have not been well documented. Eleven species are now established, most of them being restricted in range, but many are still in the process of spreading.

The first introductions to Western Australia were acclimatizations from the Zoological Gardens. The kookaburra from eastern Australia and the two species of Asian doves were released before 1900. Most of the species released at this time, however, failed to establish themselves, but some e.g. pheasant and peafowl, were successful when introduced again at a later date.

Some species have established themselves after escaping from captivity and it is thought that the goldfinch and red-browed waxbill have become established in this manner. The pigeon has escaped from domestication. Other species which have escaped from captivity but have not become established include the canary, bullfinch and chaffinch.

The cattle egret, although it was introduced in the north of Western Australia, is thought to have

become established by expansion of its natural range, as it has done in most other countries of the world.

In recent years, Indian crows and sparrows have reached our shores with increasing frequency. Usually arriving by ship, these unwanted immigrants have so far been unable to establish themselves.

Legislation designed to prevent the establishment of pest species in Western Australia has been fairly successful. Only two species have become established in relatively recent times—the goldfinch in the late 1920s, and the red-browed waxbill about 1958. However, considering these establishments and the fact that various potentially dangerous species such as Java sparrows and spice finches are being kept in aviaries in W.A., further legislation may provide a more adequate safeguard.

None of the pest species which have been introduced in the eastern States of Australia and other places in the world, have so far gained a foothold in W.A. Constant vigilance and intelligent legislation will be needed in the future to keep these species out.

SPECIES ESTABLISHED IN WESTERN AUSTRALIA

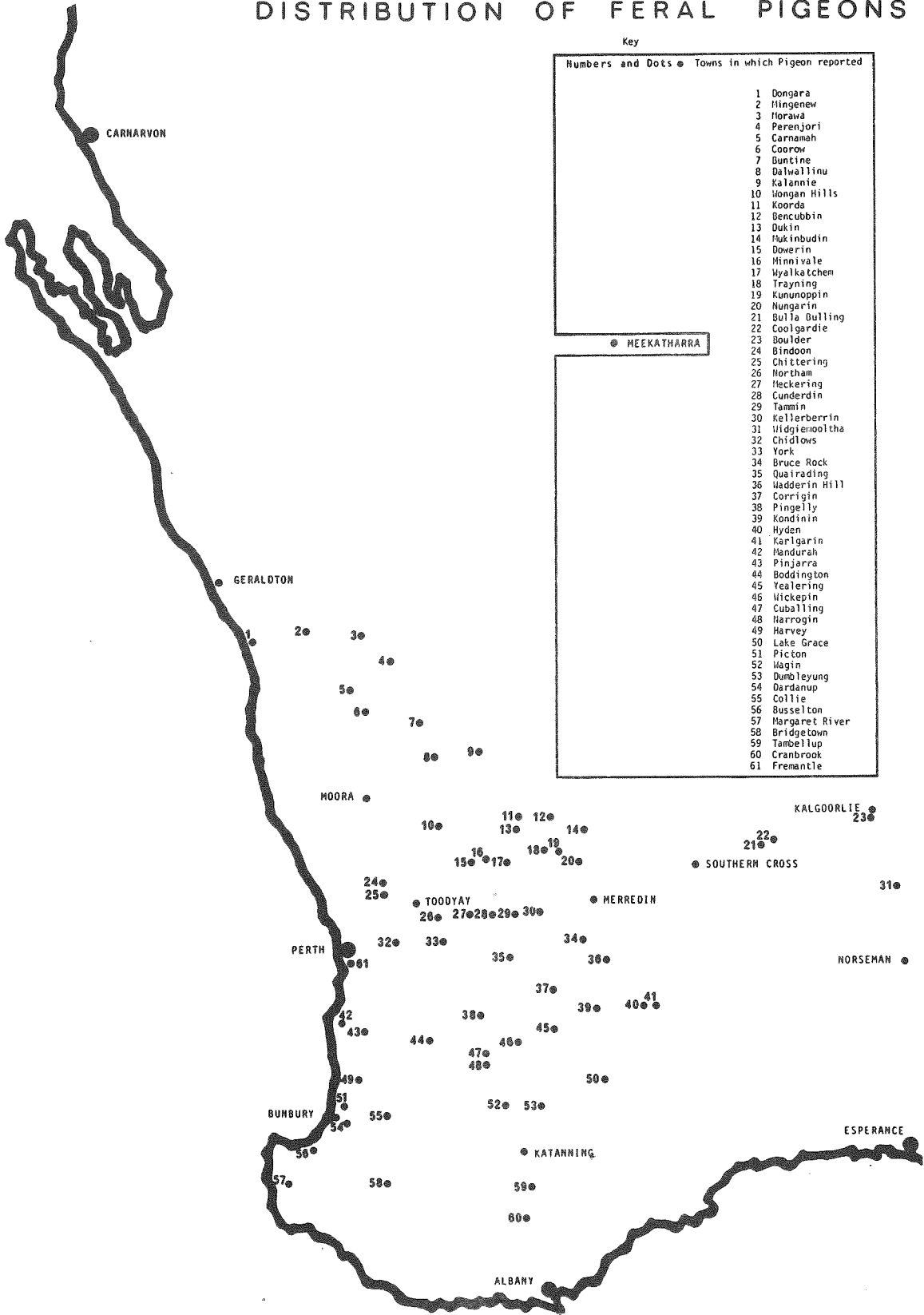
Kookaburra (*Dacelo gigas*)

Kookaburras were acclimatized from the Zoological Gardens from 1897 onwards. Between 1897 and 1912 hundreds were imported by the Acclimatization Society, and "distributed in every direction". They became established in a number of areas in the southern portion of the State before 1912 (le Souef, 1912).

Earlier independent introductions may have occurred; some birds were reported in the Mullewa area in 1896 (Jenkins 1959). By 1920, the kookaburra was becoming a familiar bird between the Darling Range and the ocean (Kingsmill, 1920).

This species is now firmly established in the south west forested country from Jurien Bay (125 miles N. of Perth) to the Albany district (237 miles S.E. of Perth). A colony is established on Bald Island (off the south coast). It has not spread eastwards as a permanent inhabitant beyond Moora, Bolgart and the Great Southern railway. Odd birds constantly penetrate further inland but apparently never form established colonies. Such temporary invasions have been noted at

DISTRIBUTION OF FERAL PIGEONS



Kellerberrin, Nangeenan, Dangin, Lake Grace, Lake King, Holt Rock, Gnowangerup and Borden.

The kookaburra appears to have been independently introduced to the Mingenew and Irwin districts and is still spreading; it has been seen at Arrino south of Dongara (Serventy & Whittell, 1962). Recently a bird was reported as far east as Ravensthorpe, but the species is not known to breed there.

Feral pigeon (*Columba livia*)

Little appears to be known about the introduction of pigeons to Western Australia. They were probably brought in by the early settlers and have since frequently escaped from captivity. They were certainly in the colony before 1890 when escaped birds which had built up flocks on Rottneest Island were destroyed because of pollution of the rainwater supply (Storr, 1965).

In 1951 they were reported to be living free among city buildings at Perth and Fremantle (Serventy & Whittell, 1951), and were already feral in a number of country areas. In 1962 they were reported as feral on Garden Island and were present throughout the Perth metropolitan area, in a number of country towns and on farms. They had been found nesting in native trees at Nangeenan, Moora, Trayning, and Yorkkrakine Rock (Serventy & Whittell, 1962). In recent years pigeons have been reported living away from towns in bush areas at North Baandee and east of Kununoppin.

Surveys in 1968-69 showed that feral pigeons were widely distributed in the metropolitan area and adjacent areas from Fremantle to Midland and Armadale and also in 77 country towns in W.A. (Long, 1971).

Although pigeons are a nuisance in cities throughout the world, they have been declared vermin only in the Toodyay area of Western Australia in response to a request in 1950. They are not however, protected and may be destroyed if a nuisance. The number of reports of damage by fouling have increased in recent years and this species will probably become a bigger problem as it spreads and numbers increase.

Indian turtle dove (*Streptopelia chinensis*) and Senegal turtle dove (*Streptopelia senegalensis*)

Both species were acclimatized from the Zoological Gardens in about 1898 (Serventy & Whittell, 1951). Before 1912, they had become established in Perth and suburbs (le Souef, 1912).

They are mentioned in 1920 as being continually despatched to applicants in various country districts, where they do well especially if pine trees are available for nesting (Kingsmill, 1920). In 1929 they were reported to have spread "far and wide" following the road lines (Colebatch, 1929). Apparently they did not spread far beyond the Perth metropolitan area but, since the mid 1930s have steadily increased their range. (Sedgwick, 1957). Both species are now established at some isolated centres such as Kalgoorlie.

S. chinensis reached Rottneest Island about 1937 (Storr, 1965) and in 1958 it was reported at various centres along the eastern railway to Wooroloo. Sporadic sightings were reported southwards as far as Quindalup, with isolated occurrences elsewhere such as Dongara, Kalgoorlie and Katanning (Sedgwick, 1957; Serventy & Whittell, 1962).

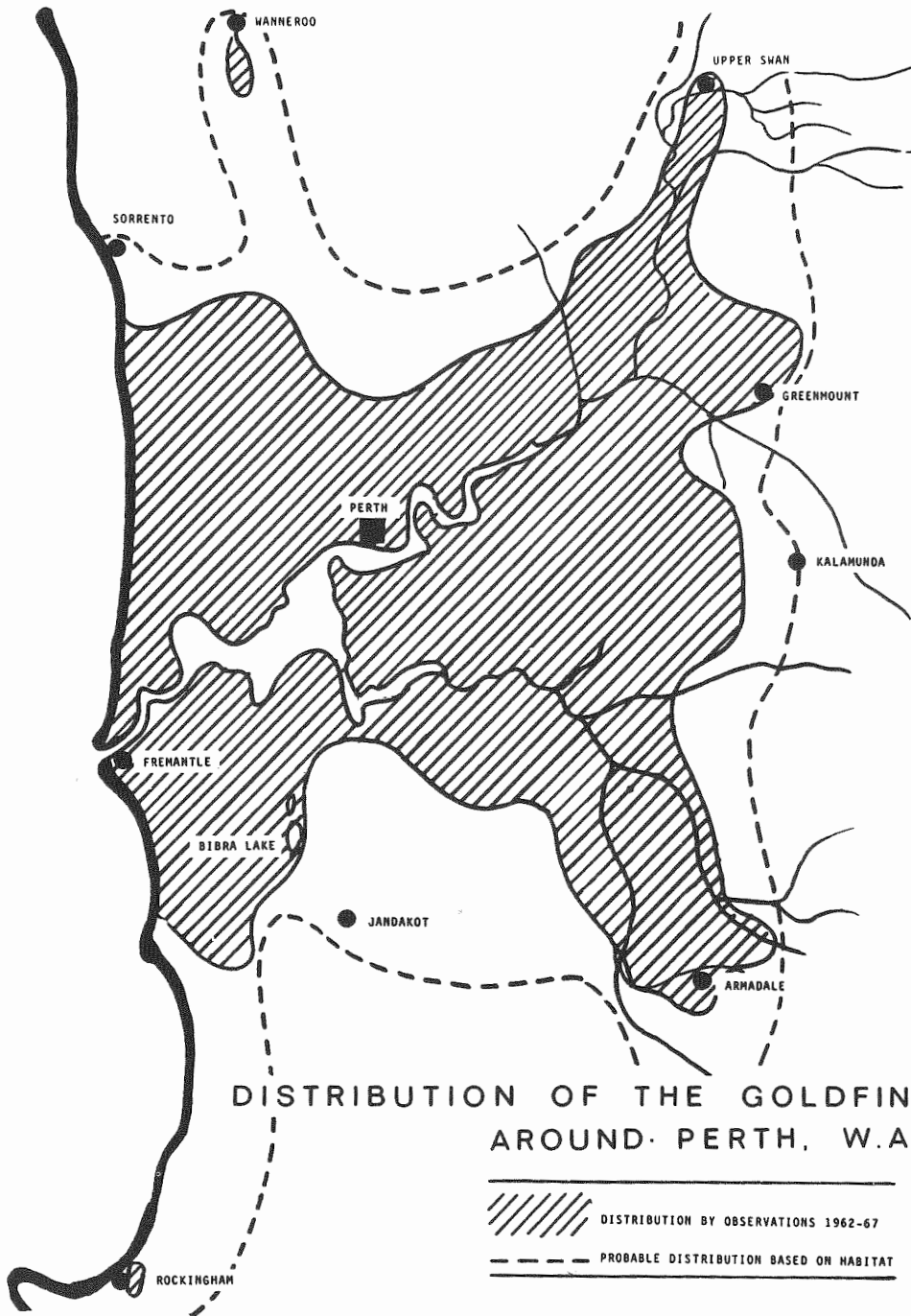
S. senegalensis has extended its range further than the Indian species (Sedgwick, 1957). It reached Rottneest Island about 1930 (Storr, 1965) and in 1958 was established at a number of centres in the wheatbelt between Geraldton and Tambellup and east to Beacon and Merredin. Isolated colonies exist at Kalgoorlie and Esperance (Sedgwick, 1957; Serventy & Whittell, 1962).

Damage by these species is occasionally reported in the metropolitan area, usually by market gardeners and nursery owners. The birds are accused of eating germinating seedlings. Neither species is protected under the Fauna Act, but they are not declared vermin.

Goldfinch (*Carduelis carduelis*)

It is known that Goldfinches were liberated in Western Australia before 1912 as they are included on a list of liberations by the Acclimatization Committee at that time (le Souef, 1912). It was presumed that these did not survive, though goldfinches were reported at Graylands between 1927 and 1930 (Pepper, 1970). Free-living birds were recorded in October, 1933, in Supreme Court Gardens, Perth (Jenkins, 1959). By 1948 they had spread into a number of suburbs, but were not plentiful (Serventy, 1948).

They were still slowly spreading in the early 1960s (Serventy & Whittell, 1951 & 1962) and by 1967 were widely distributed in the Perth metropolitan area and surrounds west of the Darling Scarp. The birds range from Wanneroo and Upper Swan in the north to a few miles south of Armadale, Forrestdale and Bibra Lake with a few birds as far south as Rockingham (Long, 1967(a)).



Outside the metropolitan area, goldfinches were found established at Albany (237 miles S.E. of Perth) in 1955 (Jenkins, 1959) and, despite the vermin control authority's efforts to destroy them, they were noted again in 1957 (Sedgwick, 1957). Flocks of about 20 birds were noted in Albany in October, 1969 (Rowland, 1970) and in the same year one was reported just east of Mt. Barker (30 miles N. of Albany).

Isolated reports of birds have come from country centres such as Kalgoorlie (335 miles E. of Perth) and Collie (100 miles S. of Perth), but these are thought to have been escapees from aviaries, as there have been no further records (Long, 1967(a)).

At present the goldfinch is declared vermin in Western Australia, but recent food studies indicate that the species does no damage so the legislation against it may be reconsidered.

White swan or mute swan (*Cygnus olor*)

The white swan was apparently introduced between 1897 and 1912, as it is mentioned in 1912 as being successfully acclimatized on ornamental waters around Perth. A number had already been distributed to many country towns (le Souef, 1912), and were later reported to be breeding freely in the wild (Colebatch, 1929).

At present, the species is found on ornamental waters such as in Queens Gardens and Hyde Park and is established on the Avon River at Northam (50 miles E. of Perth), where it breeds. Pairs have been liberated on some southern rivers, such as the Blackwood river at Bridgetown (150 miles S. of Perth), but the species has shown no inclination to extend its range or increase markedly in numbers (Serventy & Whittell, 1951 and 1962).

Red-browed waxbill or Sydney waxbill (*Estrilda temporalis*)

The red-browed waxbill was found well established in orchard clearings in Darling Range gullies east of Perth in 1958 (Dell, 1965).

At present it appears to inhabit a small area from Bickley, Hackett Gully, the Dell and to the edge of the scarp towards Helena Valley and Darlington.

Mallard (*Anas platyrhynchos*)

The mallard was reported on a large number of ornamental waters around Perth by 1912 (le Souef 1912). At this time they were said to be breeding

well and spreading. In 1920, mallards were living in the Zoological Gardens and in some city parks (Kingsmill, 1920). At present, this species lives in a free state in some parks in the metropolitan area (Serventy & Whittell, 1962), but does not appear to spread much or increase greatly in numbers.

Ring-necked pheasant (*Phasianus colchicus*)

Pheasants were introduced by the Acclimatization Committee some time after 1897, and are mentioned in a list of liberations made before 1912 (le Souef, 1912). In 1920 (Kingsmill, 1920) and 1929 (Colebatch, 1929), it was reported that introductions of pheasants had not met with much success.

Further introductions by the Zoological Gardens to Rottnest Island in 1928 were successful. Pheasants were released by a Mr. H.A. Pearse in January, 1928, on Rottnest (Jenkins, 1959; Storr, 1965). In 1948 they were reported as widespread (Jenkins, 1959) and in 1965 as a moderately common resident (Storr, 1965).

Peafowl (*Pavo cristatus*)

Young birds bred in the Zoological Gardens were released in various parts of the State before 1912 (le Souef, 1912). The Zoological Gardens authorities apparently introduced the bird at various places on the mainland, including Gingin (62 miles N. of Perth) and Pinjarra (50 miles S. of Perth), but by 1959 only a limited number survived at Pinjarra (Jenkins, 1959).

Peafowl were introduced on Rottnest Island in 1912 (Jenkins, 1959), between 1910 and 1915 or in 1917 (Storr, 1965). In 1965, about 50 birds were established there (Storr, 1965).

Cattle egret (*Bubulcus ibis*)

Before their introduction, some publicity had been given to the value of cattle egrets in controlling cattle tick, blowfly and buffalo-fly. This prompted the Council for Scientific and Industrial Research to seek the advice of authorities in India on the matter (C.S.I.R., 1933). Their reply was that these birds were quite ineffective for such control, but no doubt consumed large numbers of the pests. However, twenty cattle egrets were brought to Western Australia in 1933 following representations from the Pastoralist Association, and 18 were subsequently liberated along the Leonard River at Kimberley Downs station (Jenkins, 1959) in the north of the State.

The birds liberated were apparently imported from India (Serventy & Whittell, 1951; Hewitt,

1960). Observers in the area state that the birds soon disappeared and that they probably fell prey to hawks (Jenkins, 1959). There appears no evidence that the egrets now in Australia owe their origin to the Kimberley birds (Tarr, 1950). They have probably become established here as a result of expansion of their natural range as has happened in most countries of the world.

The first record of the bird becoming established in Western Australia was at Millstream station (S. of Roebourne in the N.W. of the State), on the Fortescue river in 1949, when a single bird was seen (Serventy & Whittell, 1962). In 1952 birds were observed in the south-west at Three Springs (163 miles N. of Perth) (Serventy & Whittell, 1962), 1952-53 at Norseman (340 miles E. of Perth) (Jenkins & Ford, 1960; Serventy & Whittell, 1962), Bunbury (100 miles S. of Perth) (Serventy & Whittell, 1962), Kellerberrin (112 miles E. of Perth) and Bibra Lake (near Perth), in 1954 at Bremer Bay (260 miles S.E. of Perth), Queens Park and Wanneroo and in 1958 at Middle Swan (Perth suburbs), Mt. Many Peaks and Ravensthorpe (on south coast) (Jenkins & Ford, 1960). By 1959 the invasion was widespread throughout the south-west of Western Australia (Jenkins & Ford, 1960).

SPECIES INTRODUCED BUT NOT ESTABLISHED

House sparrow (*Passer domesticus*)

In about 1914, sparrows crossed the border between South Australia and Western Australia at Eucla. They reached Mundrabilla station (55 miles W. of S.A. border) (Jenkins, 1959) about 1918, but died out in the following summer (Serventy & Whittell, 1962).

In 1927 or 1928 the Chief Inspector of Rabbits of the Department of Agriculture, stated that "at intervals odd birds and nests have been found in trucks on the trans-'line and, about five years ago, one of my officers was sent to the South Australian border and cleared up a colony of about 10 birds which he found on this side of the border" (Serventy, 1928). Vigorous steps were taken to prevent sparrows entering the State, both by the coastal route and along the Trans Australian Railway (Jenkins, 1959).

These measures were successful as, despite early invasions, the birds are not established west of the South Australian border. One of the contributory checks to the sparrows' western progress must undoubtedly have been the replacement of the horse by the motor vehicle as a means of transport (Jenkins, 1959). Presumably, sparrows could

obtain grain from horse feeding troughs or from droppings.

Besides the overland route as a means of invading the western section of the continent, sparrows still had an alternative i.e. by sea. Since the early invasion most, if not all, have probably entered the State by this means.

The first record of sparrows in the Perth metropolitan area was in December, 1897 (Lindley-Cohen, 1898(a)) when five specimens were shot near central Perth (Helms, 1898) (Jenkins, 1959, records this date as 1894 but this is incorrect). Further reference to this incident is made by the Chief Inspector of Rabbits (Mr. C.J. Craig) who stated that two birds had been shot in 1898 in the Government Gardens by Mr. R. Helms (Serventy, 1928).

At that time, poisoned wheat was laid out in Government Gardens and a further report of sparrows in the Claremont (Perth suburb) area investigated (Lindley-Cohen, 1898(a)). The country between Perth and Fremantle was also searched in February, 1898, but no further sparrows were found (Lindley-Cohen, 1898(b)). They were reported again in 1911 or 1912 at Fremantle (Crawford, 1911-1912), but no evidence was found of them (Crawford, 1912-13).

A sparrow was killed at Fremantle in 1927 after a pair had been released by a passenger from the liner "Carinthia"; the other eluded capture (Serventy, 1928). A single bird was destroyed in 1930, another in 1946, and two at Fremantle wharf in 1957 (Jenkins, 1959).

In 1963, a number of sightings were reported from the Fremantle area, but no sparrows were actually found until March, 1964 when nine birds were shot near the railway station by an employee of the Agriculture Protection Board (Long, 1964). Also in 1963, dead birds were presented to the shire council at Carnamah (155 miles N. of Perth) as having been shot in this area. However, the report was found to be false and the birds were actually brought dead from South Australia. Since that date the only sparrows found in Western Australia have been tree sparrows (*P. montanus*).

Tree sparrow (*Passer montanus*)

It has been assumed that all of the earlier records of "sparrows" in Western Australia have alluded to the house sparrow and that the tree sparrow has only recently been recorded here.

In September, 1966, two birds shot on the Geraldton wharf (230 miles N. of Perth) were sent

to the Agriculture Protection Board and identified as tree sparrows. They were reported to have accompanied a ship whose last port of call had been somewhere in south-east Asia. In December, 1970, another tree sparrow was shot by an A.P.B. officer at Palmyra, a Perth suburb.

Starling (*Sturnus vulgaris*)

In 1895, the then Bureau of Agriculture placed the starling on a list of birds prohibited from importation into Western Australia. In 1898 the Acclimatization Committee, formed the previous year, made strong recommendations to the Bureau for its release (Lindley-Cohen, 1898). Fortunately, the Bureau was well advised and the starling was not imported.

A report on the professed usefulness of starlings to orchardists appeared in the same year (Helms, 1898(a)) and pointed out the dangers associated with such an introduction. Although starlings were thought by many to be useful insect pest destroyers they could also be destructive, damaging both fruit and grain crops.

In February, 1906, a letter in *The West Australian* newspaper indicates that a pair of starling were seen at Guildford (Perth suburb) (Grasby, 1906), but later in the same year this was reported as an unfounded rumour and was possibly due to confusion with wattle birds (Despeissis, 1906).

Two other early records of the presence of starlings in Western Australia have never been confirmed. They were reported to be present and possibly breeding in the Balingup area (125 miles S. of Perth) in 1914-15 when two were said to have been shot and a nest found; and in 1917 Mr. W.B. Alexander of the South Australian Ornithological Association stated that one had been sent from Albany to Perth for identification (Whittell, 1950). The starling has been recorded few times in the wild in Western Australia. One was shot at Gingin in 1936 (Jenkins, 1959; Long, 1965) and in 1970 one was shot a few miles from Esperance (240 miles E. of Albany).

Indian crow (*Corvus splendens*)

The Indian crow is apparently not established in Western Australia but occasionally reached our shores by accompanying ships from overseas countries (Jenkins, 1959; Long, 1967).

The earliest record of this species arriving by ship in Western Australia was of three birds accompanying the s.s. "Naldera" from Colombo to

Fremantle in 1926 (Hylton, 1927). One died near Fremantle and the other two flew ashore. One was observed in February 1928 (Jenkins, 1959).

Three Indian crows were shot at Fremantle between 1937 and 1949 (Long, 1967), and six are known to have accompanied a ship from India and landed at Fremantle in 1942 (Ruddiman, 1952). In 1945 a suspected Indian crow was reported at Coolup (50 miles S. of Perth) (Robinson, 1950) but the bird was not captured.

The presence of Indian crows in Western Australia was first reported to the Agriculture Protection Board in 1950 when two were shot at Fremantle and taken to the Museum for identification (Long, 1967). Since then, they have appeared fairly regularly and in 1967 it was estimated that about 16 birds had been shot between 1950 and 1961 (Long, 1967). More recent investigations indicate that the total since 1950 is considerably larger.

Since 1950 the following Indian crows have been recorded destroyed most of them in the Perth metropolitan area:-

- 1951 : 5 birds : Three at Fremantle, nesting also recorded (Jenkins, 1959); one at Claremont (Jenkins, 1959; Long, 1967) and one at Boyup Brook (130 miles S. of Perth). In the same year a number of unverified reports were also received from York (50 miles E. of Perth), Goomalling (75 miles N.E. of Perth), Coolup, and in the Perth metropolitan area at Gosnells, Yanchep and North Perth (Jenkins, 1959).
- 1952 : 2 birds : One at Bicton and one at Claremont (Jenkins, 1959).
- 1953 : 1 bird : At Moora (90 miles N. of Perth) (Jenkins, 1959).
- 1954 : 3 birds : One at Hilton Park (Jenkins, 1959) and two at Bicton in July.
- 1956 : 1 bird : At Bunbury (100 miles S. of Perth) (Long, 1967).
- 1957 : A well authenticated report from Bunbury, but no bird was collected (Jenkins, 1959).
- 1958 : 1 bird : At Kwinana (Jenkins, 1959; Long 1967).
- 1959 : 2 birds : One at South Perth and one at Fremantle (Long, 1967).
- 1960 : 8 birds : One each at Yanchep, Wembley, Byford, Attadale, Fremantle, North Fremantle and one shot in an unspecified area and presumed dead (Long, 1967). Another bird was shot at Cottesloe.
- 1961 : 1 bird : At Cottesloe (Long, 1967).
- 1965 : 1 bird : At Rockingham.
- 1966 : 2 birds : At North Wharf, Fremantle.

1967 : 1 bird : At Kalbarri (mouth of the Murchison river).

From 1950 to the end of 1967 some 30 Indian crows were destroyed in Western Australia.

Quail and American quail (species unknown)

Quail are mentioned in a list of liberations by the Acclimatization Committee before 1912 (le Souef, 1912). A large number were said to be liberated, but in 1912 it was reported too soon to say whether they had become established. In 1929 Chinese quail, liberated some time earlier, were reported to have done well (Colebatch, 1929).

American quail were apparently introduced to Rottnest Island by Governor Ord in 1876 (Storr, 1965), but they failed to become established.

Guinea fowl (*Numida meleagris*)

Hundreds of guinea fowl were imported and distributed among farmers throughout Western Australia before 1912. Most of them were kept in captivity while the young were allowed to roam in the hope that they would become established (le Souef, 1912). By the 1920s they were reported to be thriving in our coastal districts (Kingsmill, 1920; Colebatch, 1929) following the tuart belt which extends for some 200 miles (50 miles N. to 150 miles S. of Perth) within a few miles of the ocean (Kingsmill, 1920). Although they were repeatedly released in this area guinea fowl did not become permanently established. In inland districts the birds did not breed well and attempts to establish them failed (Kingsmill, 1920).

Guinea fowl were also introduced to Rottnest Island (Storr, 1965), but failed to become established.

Partridge and Mexican partridge (species unknown)

Partridge were released in Western Australia by the Acclimatization Committee some time between 1897 and 1912 (le Souef, 1912). In the 1920s it was reported that they had so far failed to establish (Colebatch, 1929).

Mexican partridge were released on Rottnest Island in 1928 (Storr, 1965) but failed to establish themselves (Glauert, 1956; Storr, 1965).

Geese and ducks (Numerous species)

Several species of geese and ducks were liberated in Western Australia by the Acclimatization Committee before 1912 (le Souef,

1912). In 1929 it was reported that large numbers of waterfowl had been hatched and released and in many cases were spreading widely (Colebatch, 1929).

The following three species are known to have been released:-

Black African spur-winged geese (*Plectropterus gambensis*)

Were still being distributed in 1920, but it was reported to be too early to pronounce a verdict on them (Kingsmill, 1920).

Canadian wild geese (Canada goose) (*Branta canadensis*)

Were said to have been sent to one or more districts some time before 1920, but it was reported that it was too early to say whether they had been successfully established (Kingsmill, 1920). This species and spur-winged geese were later reported to breed freely and it was thought that they might become valuable game birds (Colebatch, 1929).

Egyptian geese (*Alopochen aegyptiacus*)

Were apparently introduced to Rottnest Island, as mention is made in 1956 of their disappearance (Glauert, 1956).

Apparently the only species which became established in Western Australia was the mallard mentioned earlier.

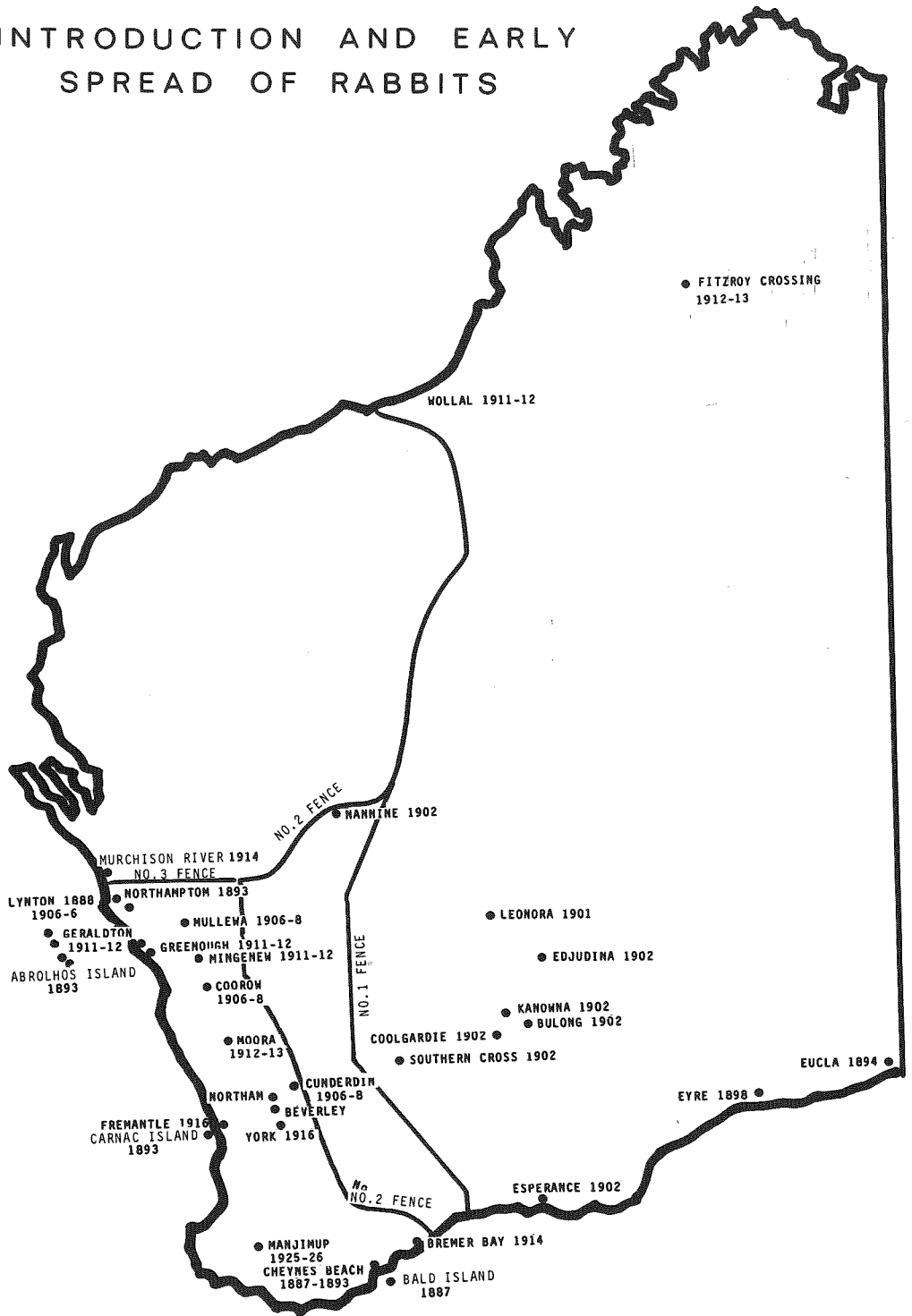
Ostrich (*Struthio camelus*)

The ostrich is also mentioned in the list of liberations published in 1912 by the Acclimatization Committee (le Souef, 1912). Some birds were kept in partial captivity at Gingin, and others were permitted to live under natural conditions. The latter group was apparently thriving in 1912 (le Souef, 1912). The young of birds breeding in the Zoological Gardens were also liberated at Mount Morgan (E. of Leonora) in the Goldfields (le Souef, 1912). The ostrich, however, did not become established in Western Australia.

OTHER INTRODUCTIONS

The Pekin nightingale (probably *Leiothrix lutea*) and the English skylark (probably *Alauda arvensis*) were also liberated in Western Australia by the Acclimatization Committee before 1912 (le Souef, 1912). Neither of them has become established.

INTRODUCTION AND EARLY SPREAD OF RABBITS



A number of escapees from aviaries are occasionally seen in the metropolitan area. A chaffinch or greenfinch was noted in 1910 (Cleland, 1910) and the bullfinch (*Pyrrhula pyrrhula*) and chaffinch (*Fringilla coelebs*) were apparently found in the wild before 1937 (Serventy, 1937). In recent years the canary (*Serinus canarius*) double barred finch (*Poephila bichenovii*), blackheart (*Poephila acuticauda*) and Adelaide rosella have been seen, but are not established.

Two native species have been introduced to Rottnest Island with little success. Mallee fowl taken to the Island in 1928 died before they could be released and magpies (*Gymnorhina dorsalis*) have been introduced from time to time. They were breeding there in 1958, but their present status is uncertain (Storr, 1965).

MAMMALS

The establishment of mammals in Western Australia appears to have been more successful than that of birds. Of 29 species which are known to have been introduced, 15 are established, 4 may be established and 10 have failed. Rabbits, foxes, cats, dingoes, rats and mice are widespread; feral animals such as goats, donkeys, camels, pigs, cattle and horses are restricted to certain areas; water buffalo are limited to a small area in the Kimberleys and palm squirrels to a limited area within the city of Perth.

Blackbuck and red deer may still be present in small numbers; ferrets, sheep and dogs occasionally become established in the wild.

Rusine deer, sambar deer, fallow deer, hog deer, eland, African buffalo, zebra, vicuna, llama, and hare have failed to become established. The release and establishment of exotic mammals in the wild is exceedingly dangerous as most of those established have become pests of agriculture.

SPECIES ESTABLISHED IN WESTERN AUSTRALIA

Dingo (*Canis familiaris* var. Dingo)

Dingoes are thought to have been introduced to this continent by primitive aborigines or adjacent native peoples along a northern sea route (Troughton, 1957). They were certainly here when the white man arrived from Europe.

Dingoes are distributed over the whole of W.A., although in some areas they have been restricted

to more remote areas by settlement and the destruction of large numbers. The highest concentrations are said to be in the Kimberleys and north-west of the State (Tomlinson, 1955).

The dingo is a pest of economic importance throughout the agricultural and pastoral areas of the State. The intensity of the problem has probably become less as settlement has advanced, but it is still acute in outback areas and sufficiently serious in many settled areas to cause concern (Tomlinson, 1955).

Rabbit (*Oryctolagus cuniculus*)

Rabbits were seen at Eucla, W.A. in 1894 having spread from Geelong, Victoria where they were introduced in 1859 (Ratcliffe, 1959). Some were certainly in W.A. before this date. In 1887 they were reported from Cheynes Beach and Bald Island (one mile off southern coast) and in 1893 were at Northampton, Carnac Island, Cheynes Beach, and the Abrolhos Islands (Gillett, 1968). They were apparently introduced at Lynton (see map) in about 1888 (Crawford, 1908).

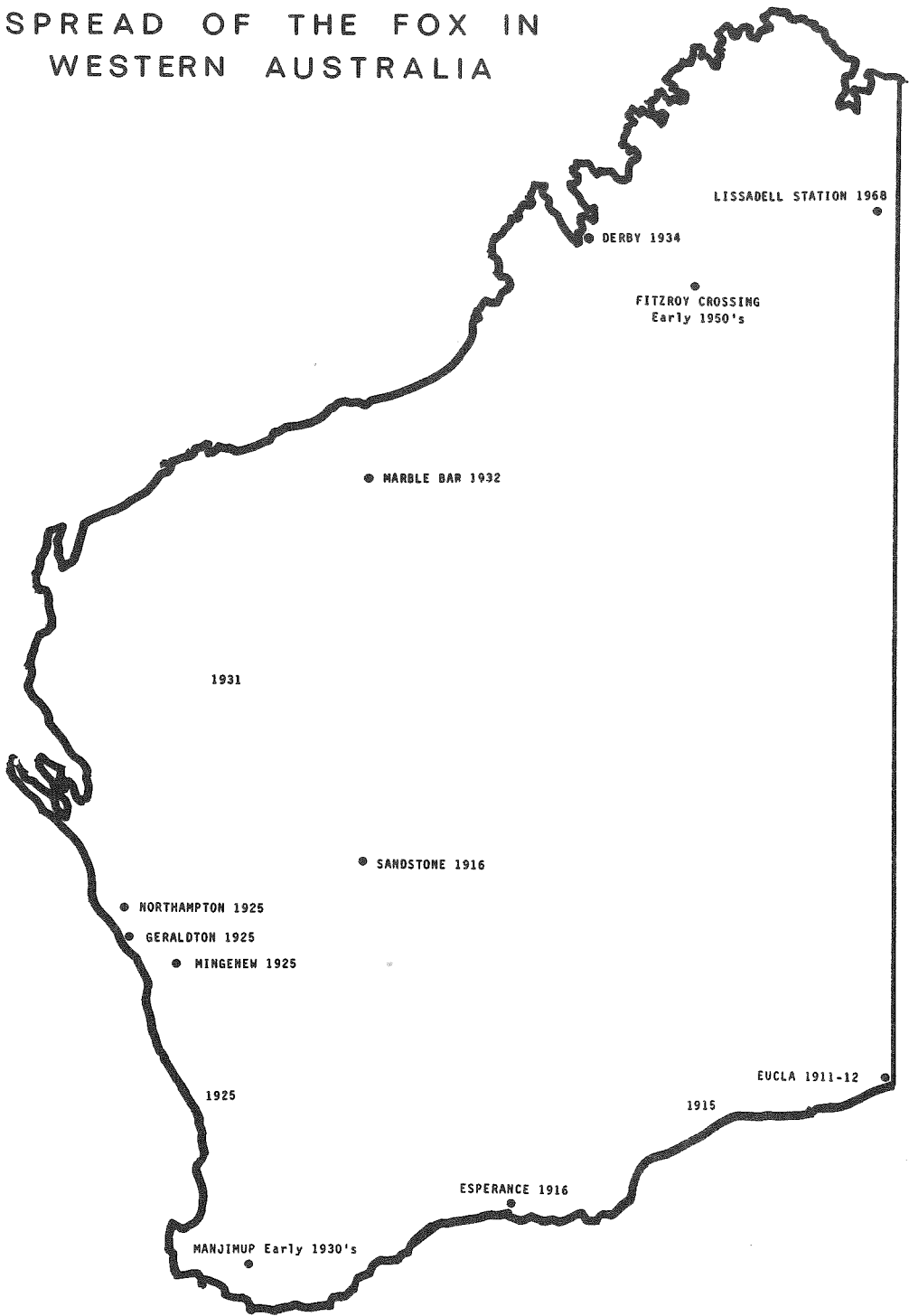
In 1902, it was reported that rabbits had been introduced sometime earlier at a number of places along the coast and had been in existence for many years in various localities (Wilson, 1902).

In 1896 Arthur Mason (Mason, 1896) reported rabbits between Eucla and the border and up to 120 miles west of Eucla. By 1898 they were found scattered along the south coast from Israelite Bay to Eyre (Gillett, 1968). In 1901 Canning, (Canning, 1902) while surveying for the No. 1 rabbit proof fence, records that rabbits were reported as far north as Leonora.

By 1902, they were reported at Edjudina, Coolgardie, Bulong, Kanowna, Southern Cross, Esperance and Nannine; and were established in the Coolgardie Goldfields districts and southwards to the coast a little west of Esperance (Wilson, 1902).

Between 1906 and 1908, rabbits were reported inside the No. 2 rabbit proof fence at Mullewa, Coorow, north of Cunderdin and at Lynton (Crawford, 1908). This report probably influenced the statement (Ratcliffe, 1959) that rabbits had reached the west coast at a point north of Geraldton by 1907. At this time rabbits were widely scattered between the rabbit proof fences but the remainder of the agricultural areas were apparently still free. By 1911-12 they had reached Mingenew and had spread from Northampton to Geraldton and Greenough. They were also found

SPREAD OF THE FOX IN WESTERN AUSTRALIA



at Wollal and several places south of there (Crawford, 1911-12). In 1912-13 they had spread, probably from the Geraldton region, as far south as Moora and one was killed at Fitzroy Crossing in the Kimberleys (Crawford, 1912-13).

With the initial momentum of colonization, rabbits spread far northwards and were found over most of the pastoral regions as far north as Port Hedland. However, with unfavourable seasons, they died out but are still occasionally found in numbers at such places as Mundiwindi, east of Marble Bar and at the top of the Canning Stock Route. Penetration into the more heavily timbered southern portion of the State was at a much slower rate.

In 1914, rabbits were inside the No. 2 fence at Bremer Bay, and were also found from 40 miles north of Fremantle to the mouth of the Murchison River and along the Midland Railway (Crawford, 1914). They had reached Fremantle by 1916 and were also found west of the No. 2 fence in line with Northam, York and Beverley (Crawford, 1916).

In the lower south-west, rabbits were frequently reported in the early 1920s and they apparently reached the Manjimup district in 1925-26 (Gooding, 1956) and were well established by 1928.

By the early 1930s rabbits had apparently colonized all of the suitable areas in the State. They are now established over most of the State as far north as the Kimberleys, but are not economically important further north than Shark Bay or in inland pastoral areas where their distribution is generally sparse. Rabbits were reported to have been introduced on a number of islands off the coast of W.A. early in the 19th. century, but in recent years they have only been reported from Goose Island in the Recherche Archipelago (Main, 1963; Fraser, 1963), Sandy Island, south of Pemberton (Fraser, 1963) (not known if they still exist), and Carnac Island (off Fremantle) until exterminated in 1969.

Fox (*Vulpes vulpes*)

Foxes were first reported in W.A. west of and near Eucla in 1911-12 (Crawford, 1911-12) and 100 miles west of the South Australian border in 1915 (Crawford, 1915). One was reported at Esperance in 1916 and one was shot at Sandstone in the same year (Crawford, 1916).

These animals are thought to have spread into W.A. from Victoria where they were released from

1845 to the 1880s (Terry, 1963; Troughton, 1957). The fox appeared to follow approximately the same path of invasion as the rabbit though several years later.

By 1925, they were reported (le Souef, 1925) to be distributed around the coastline of W.A. as far north as Geraldton but had not extended very far inland. In 1925 the only place they appeared numerous was in a belt of country stretching from Northampton to Geraldton and Mingenew.

After 1925, their spread in W.A. was rapid (Gooding, 1955), especially into the pastoral areas. By 1931, foxes were in every district except Marble Bar and the Kimberleys. By 1934, all areas in the south-west corner of the State had paid bonuses on fox scalps (Gooding, 1955). They were present in the Manjimup district in the early 1930s (Gooding, 1956). Foxes are now spread almost throughout the State. They have not flourished in the Kimberleys (Gooding, 1955) as they have done elsewhere. However, a number have been reported north of the Fitzroy River in the West Kimberleys since the early 1950s and they are now fairly common in the area. In December, 1968, one was trapped on Lissadell station in the East Kimberleys and it seems that the fox is slowly completing colonization of this State.

Black rat (*Rattus rattus*), Norway rat (*Rattus norvegicus*) and House mouse (*Mus musculus*)

It is not known when these pests became established in W.A. but it was probably soon after the arrival of the first settlers in the late 1820s.

They are now well established in W.A., particularly the house mouse, which is found in areas far from settlement. The range of both rats is not well known. The black rat appears to be established in most towns throughout W.A. and is probably far more widespread than the Norway species. The Norway rat seems to be confined to coastal ports and townships along the larger watercourses. The house mouse is widespread throughout the State.

Indian palm squirrel (*Funambulus pennanti* or *F. palmarum*)

Palm squirrels were established in the Zoological Gardens, South Perth in the late 1890s or the early 1900s. They remained confined to the Gardens for many years, but in the last decade or two have been reported in urban areas within about a mile of the Zoo. In 1967, one was found at Raphael Park, nearly three miles from the Zoological Gardens.

Cat (*Felis catus*)

Since the first settlement in W.A., cats have escaped from domestication and established themselves in the wild. The only recorded deliberate liberation appears to have been by the Colonial Secretary who had 200 cats released between Eyre Patch and Mt. Ragged (on the south coast) in about 1899 to control the advance of rabbits (Gillett, 1968). In 1900, cats were reported as far east as the South Australian border and, in certain parts of W.A., were common enough to be frequently used as food by the aborigines (Aytoun, 1900). In 1908 there were large numbers in the Murchison district (Rolls, 1969). It seems possible that liberation of cats for the control of rabbits was widely advocated as the rabbit invasion advanced into this State.

Feral cats are able to breed and survive successfully in the wild, and their numbers are constantly being supplemented near settled areas by stray and abandoned pets. Consequently, they exist in various stages of semi-domestication.

Colonization of the State by feral cats closely followed, and in some cases may have preceded, the initial settlement of the country by the white man. Feral cats are now present throughout W.A. including the desert country remote from settlement. They were sufficiently abundant by 1921 to be declared vermin in W.A. although the declaration has recently been lifted.

Donkey (*Equus asinus*)

Donkeys were first imported to Australia in 1866 (Terry, 1963) or 1886 (Despeissis, 1911) by Sir Thomas Elder. They were first used in W.A. in the development of the Victoria River district and the East Kimberleys late in the 19th. century (Letts, 1964). At that time they were used as pack or draught animals and large trains carried goods from Carnarvon to the Kimberleys (Letts, 1964). In 1894, there were some 131 donkeys and mules in W.A. (Fraser, 1905).

The West Australian Government imported donkeys in 1904 from Sumatra and Mauritius (Terry, 1963) but it was reported in 1911 (Despeissis, 1911) that most of the donkeys used in our north were the progeny of those imported earlier by Elder.

Terry (1963) recorded that donkeys first became feral in the Kimberleys in the 1930s. On some properties up to 100 donkeys (mares) were kept as breeders to provide replacements for teams. Those animals which had given good service

were turned out and allowed to roam the country (McDonald, 1959).

As the donkey was superceded by the motor vehicle as a means of transport in the north, more and more were released to roam as they liked. They built up into such large herds in some areas that they were declared vermin at Nullagine and Halls Creek in 1949. Other districts later added donkeys to their list of declared vermin. These included Port Hedland, Coolgardie and Dundas in 1953; West Kimberleys in 1954; Marble Bar in 1957; and Wyndham and Meekatharra in 1958.

Feral donkeys are now widely distributed in the Kimberleys, Pilbara, North West and Goldfields districts of W.A. (Long, 1968).

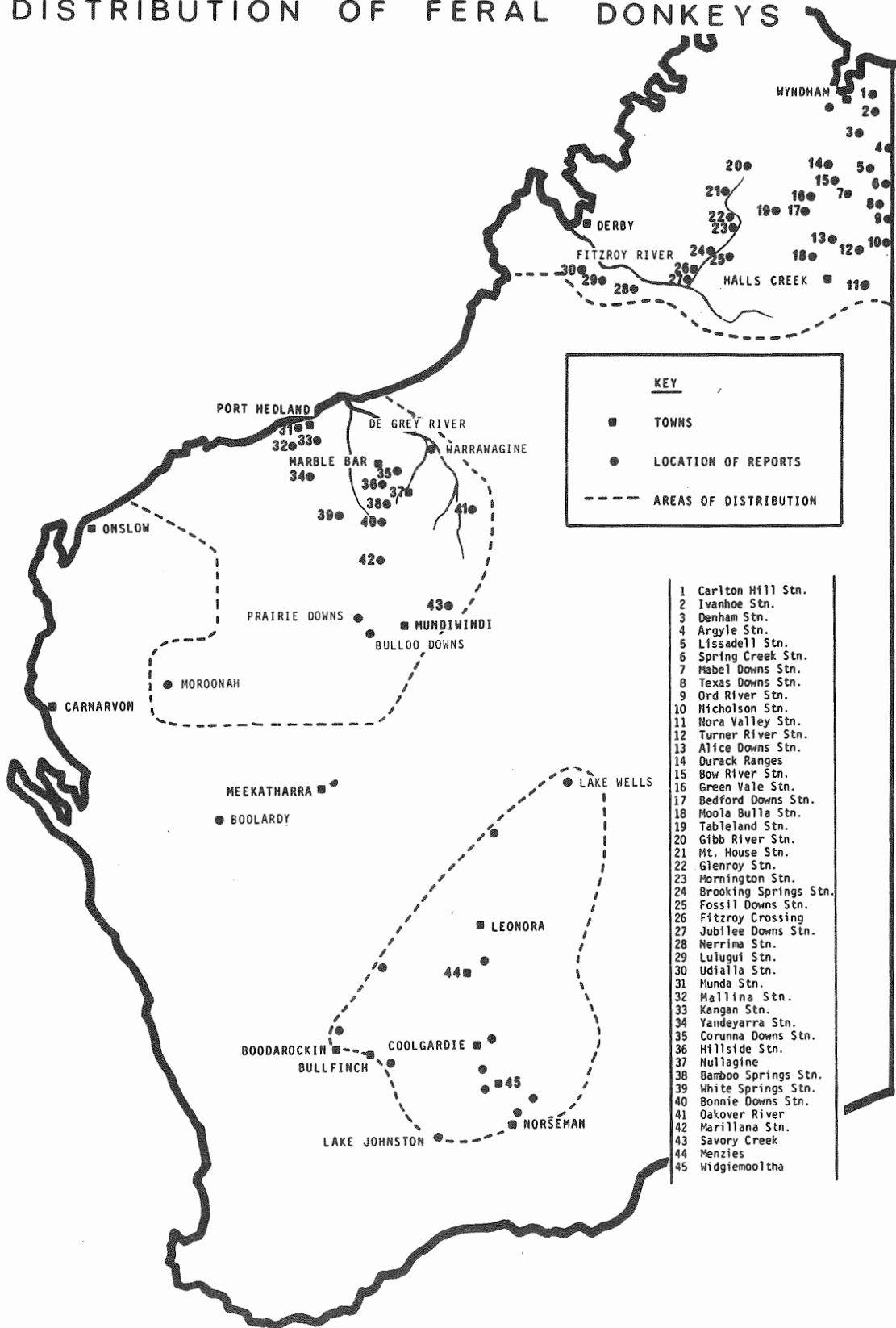
In the Kimberleys, they range from the Northern Territory border to Derby. The greatest concentrations are said to be in the East Kimberleys, extending into the Northern Territory. Total numbers are not easy to assess, but in 1957, the population was estimated by field officers of the A.P.B. at 100,000 and in 1960 at 80,000 to 90,000 donkeys. Since 1957, some 90 to 100,000 have been destroyed in shooting drives in this region. Some stations have estimated they have had more than 10,000 donkeys within their boundaries and some have claimed more donkeys than cattle. Mobs of up to 500 animals have been reported.

In 1968, it was reported that donkeys had been totally eradicated from some stations in the East Kimberleys by shooting drives, but they were still plentiful in more remote areas.

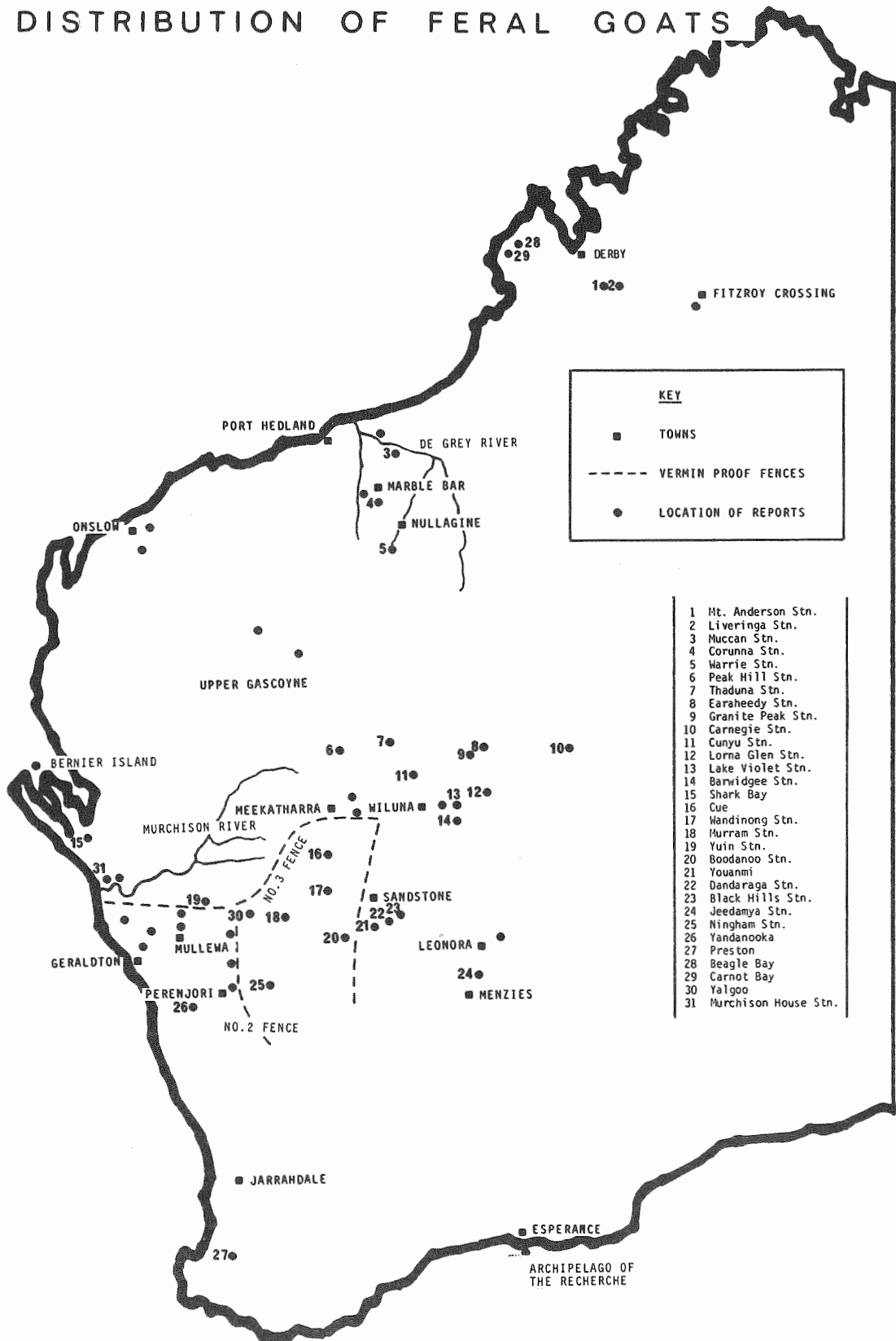
Distribution in the Pilbara and North West extends from the De Grey River west almost to Onslow and south through the Upper Gascoyne area. It was estimated by A.P.B. officers in 1957 that there were 20,000 donkeys on Bulloo Downs and Prairie Downs; and in 1960 that there were 2,000 on Maroonah station and 2,000 around Mundiwindi. In 1957, 545 were destroyed on Warrawangine station and in 1960, 462 were destroyed in the Port Hedland—Roebourne area. In 1958, some 4,000 were estimated to be in the Savory Creek area east of Mundiwindi.

In the Goldfields, donkeys are widely distributed from Lake Wells in the north, to Norseman in the south, and west through Bullfinch to Boodarockin. They have been reported in the Meekatharra area and on Boolardy station in the Murchison. Generally numbers are small in this region and mobs are widely scattered. In 1960, the Meekatharra Vermin Board reported

DISTRIBUTION OF FERAL DONKEYS



DISTRIBUTION OF FERAL GOATS



approximately 3,000 donkeys in the area, and Boolardy station reported a few hundred.

Goats (*Capra hircus*)

Goats were brought to Australia in the early colonial era in the hope of establishing a mohair industry, and to provide milk, butter and meat. They were also used for light haulage work and goat racing (Mallet, 1953). The Victorian Acclimatization Society sold 50 to Arthur Blackwood of Shark Bay about 1870 (Rolls, 1969). Some 4,500 goats were in W.A. in 1894.

In the period 1902-4 they were reported established throughout the inhabited portion of the State in small numbers (Fraser, 1905). Large flocks were grazed on stations and were eventually dispersed when the mohair industry did not achieve importance (Mallet, 1953).

By 1911 (Despeissis, 1911) flocks of goats were seen in every township in W.A. north of Port Hedland, at telegraph stations and around most homesteads in the area. Colonies were noted at the De Grey River, Carnot Bay, Beagle Bay and Derby. Some time earlier goats had been left, probably by "sealers", on the Recherche Archipelago off the southern coast.

Breeding groups escaped or became semi-feral on many stations and were declared vermin in the Upper Gascoyne district in 1928; at Marble Bar and Port Hedland in 1929; Mullewa and Meekatharra in 1954; Bernier and Dorre Islands in 1958; and on the Recherche Archipelago in 1959.

Feral goats are now found in the Kimberleys, North West, Pilbara and Murchison areas and occasionally in the south west of the State (Long, 1968). They are present on Bernier Island (Ride and Tyndale-Biscoe, 1962) and the Recherche Archipelago.

Goats are reported to be on most stations in the West Kimberleys and in some areas of the East Kimberleys. The population in the Kimberleys has been estimated by A.P.B. officers at around 10,000 animals and flocks of up to 300 were sighted near Fitzroy Crossing in 1960. Many are reported to be existing in a semi-feral state particularly in the East Kimberleys.

Distribution in the Pilbara, North-West and Murchison areas is widespread in country with suitable rocky outcrops. Their range extends from the De Grey River in the north through Meekatharra and Wiluna to Menzies in the Eastern Goldfields, throughout the Gascoyne and

Murchison areas and to at least Geraldton and Lake Moore in the south.

The majority of goats appear to be in the North West and Murchison areas and flocks of several hundred are common. In 1967, 2,200 were slaughtered on Murchison House station within six months. Goats slaughtered for export in 1965 numbered 39,200. This increased to 44,000 in 1966, most from the Lower Murchison, fell in 1965-66 to 23,000 from the Mullewa and Yalgoo areas and rose again to 40,000 in 1967, exported from Murchison and other areas to south-east Asian countries. In 1968, goats were reported as still numerous in the Murchison district.

In the south-west, small flocks were recorded near Jarrahdale (17 in catchment area) and Donnybrook (50 at Preston) and on the Recherche Archipelago (40 to 50) in the early 1960s. In 1969, seven goats were seen in the John Forrest National Park near Perth.

Camel (*Camelus arabicus*)

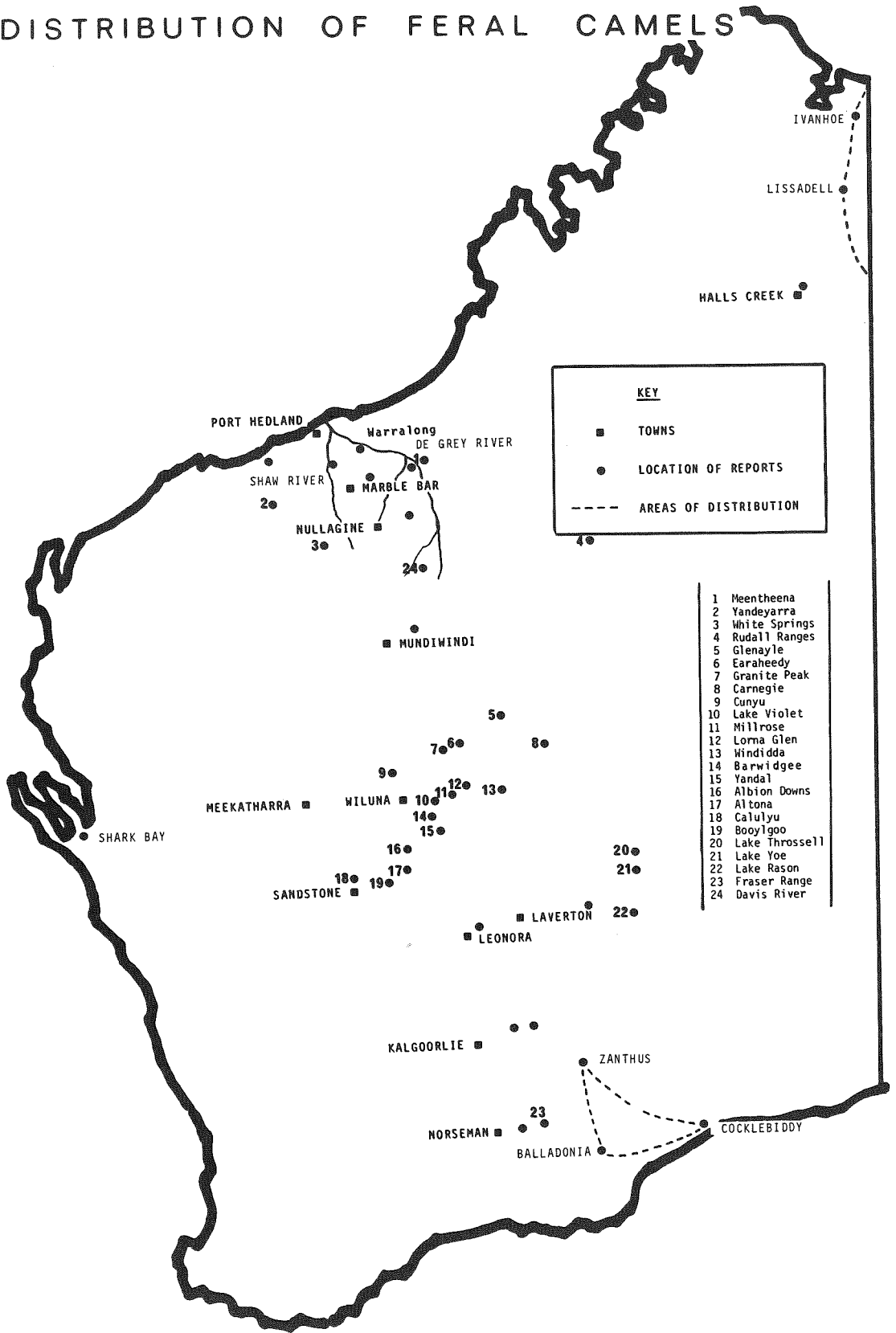
The introduction of camels to Australia was advocated in 1839 and they were imported in 1840 and 1860 (*Aust. Encyc.*, 1956). Between 1893 and 1896 more than 4,500 camels were introduced for use in the goldfields in Central Australia and W.A. (Letts, 1964). By 1900, there were 5,000 in use in W.A. (*Aust. Encyc.*, 1956).

Wandering camels were recorded as damaging the rabbit proof fences in 1908 and at this time were reported to be straying from breeding herds used to provide animals for use on the fence system (Crawford, 1908). By 1911, they were a feature of Western Australia's north-west landscape (Despeissis, 1911).

Camels were introduced to Australia to assist with exploration and development in arid areas (Letts, 1964) and their value was largely as beasts of burden. Uses included wood carting (Terry, 1936), pulling ploughs (Marten, 1938) and the construction and maintenance of the vermin proof fence systems (Despeissis, 1911).

Many camels were released in Australia (Letts, 1964) or escaped when more modern transport took their place in the 1930s. Their progeny still survive in inland districts and they sometimes become pests by damaging fences, gates and watering points. Feral camels are now established in remote areas of the Kimberleys, Pilbara and Eastern Goldfields and in the Wiluna and Meekatharra areas (Long, 1968).

DISTRIBUTION OF FERAL CAMELS



KEY

- TOWNS
- LOCATION OF REPORTS
- - - AREAS OF DISTRIBUTION

- 1 Meentheena
- 2 Yandeyarra
- 3 White Springs
- 4 Rudall Ranges
- 5 Glenayle
- 6 Earraheedy
- 7 Granite Peak
- 8 Carnegie
- 9 Cunyu
- 10 Lake Violet
- 11 Millrose
- 12 Lorna Glen
- 13 Windidda
- 14 Barwidgee
- 15 Yandal
- 16 Albion Downs
- 17 Altona
- 18 Calulyu
- 19 Booylgoo
- 20 Lake Throssell
- 21 Lake Yoe
- 22 Lake Rason
- 23 Fraser Range
- 24 Davis River

In the Kimberleys they are reported only from a strip of country near the Northern Territory border. It is possible, however, that their range extends from there through the Great Sandy Desert into the Pilbara. Thirty camels were shot in the East Kimberleys in 1965.

They are reported in the Pilbara from time to time on outlying stations. On the edge of the pastoral areas, east of Port Hedland, Marble Bar, Nullagine and Mundiwindi they were particularly numerous in 1959-60. In 1960 they were reported at Warralong station and on the Shaw River.

Their range probably extends through the desert country east of these centres to Meekatharra and Wiluna. East of Meekatharra and Wiluna and north of Sandstone, a number of stations have reported camels. In 1960, it was estimated that there were 300 camels in the Meekatharra area. In the Wiluna area in the same year, a large number of stations reported their presence; numbers varying from a few to hundreds. Distribution is thought to extend to the Eastern Goldfields.

Camels have been reported east of Leonora, Laverton, and Norseman and at Balladonia and Cocklebiddy on the Nullarbor Plain. In 1960 it was estimated that there were 200 animals in herds between Balladonia and Zanthus.

Feral camels were declared vermin in the Nullagine and Halls Creek areas in 1949 and in the Laverton and Port Hedland areas in 1959.

Pig (*Sus scrofa*)

Pigs arrived in Australia with the first fleet and in 1788 there were 49 animals in the colony (*Aust. Encyc.*, 1956). There is no evidence to suggest that pigs existed in Australia before occupation by the white man. Feral animals have originated from escaped domestic stock kept under semi-feral conditions (*Aust. Encyc.*, 1956) or from abandoned animals. As far as is known there has been no deliberate introduction of pigs into the wild in Australia (Pullar, 1950).

Groups of feral pigs have been reported (Pullar, 1950) in W.A. since 1870. Some were reported from the Darling Range in 1870, Hill station near Broome in 1894-95, the Ord River Valley (exterminated about 1925), Greenough, Gingin and the Avon River (near Beverley). In 1911 (Despeissis, 1911) wild pigs were found on the De Grey River and the Fitzroy River and, in a number of areas such as the Gascoyne River and Beagle Bay, pigs were allowed to roam about without restraint.

Feral pigs are now established in many areas of the Kimberleys, Pilbara and North-West, Lower Murchison and Geraldton areas and in the south west of the State (Long, 1968).

They inhabit several river systems in the Kimberleys between Wyndham and Derby. In 1950 (Pullar, 1950), pigs existed on the Forrest River, Isdell River and Fitzroy River (escaped 1932). These were still present in the 1960s when those along the Fitzroy were said to be increasing in numbers. Pigs were numerous on the Isdell River in 1962 and groups were reported on the Forrest, Drysdale, Charnley, Robinson, Lennard, Fitzroy and Margaret Rivers. Generally numbers are small in the Kimberleys, but fluctuate locally from scarce to abundant.

In the Pilbara and North-West, small numbers of wild pigs have been reported for many years on the De Grey, Shaw and Fortescue Rivers. The last reports from these areas were in 1960.

Pigs have been recorded along the Murchison River and Bowes River (near Northampton) (Pullar, 1950). In 1960, 30 to 40 animals were reported along the Hutt River and a small herd was sighted in the Nanson area. In 1966, feral pigs were causing damage in the Northampton area but a survey in 1967 failed to locate any large concentrations in this region.

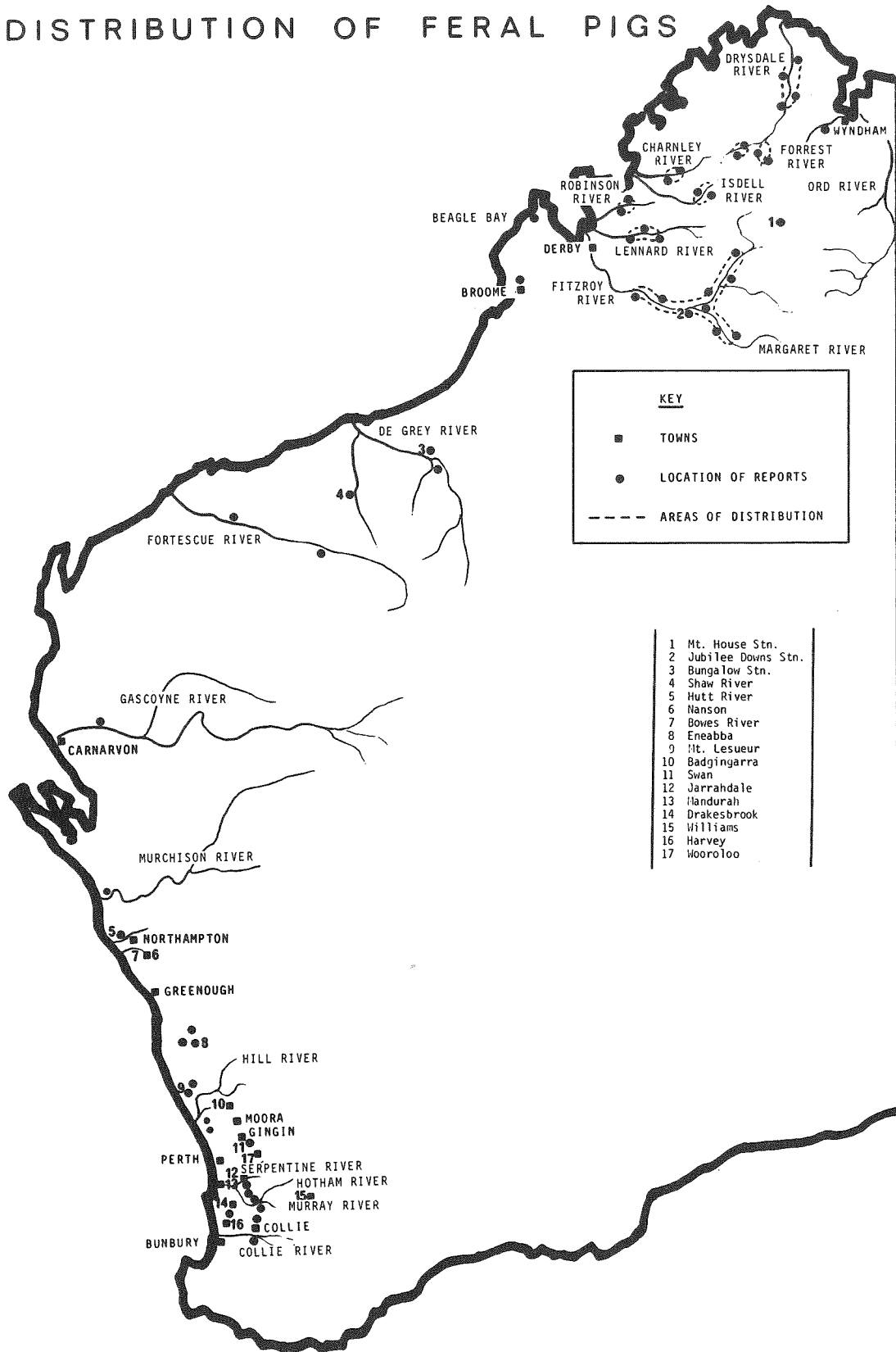
In 1950, some existed in the south west of the State (Pullar, 1950) at Wooroloo Brook, along the Darling Range, in the vicinity of the Serpentine, Brunswick, Harris, Williams and Hotham Rivers, and along the south west coast between Mandurah and Bunbury. Since then, reports have come from Waroona, Harvey, Collie, Drakesbrook, Serpentine/Jarrahdale and Dwellingup. In these areas, pigs inhabit the hilly and swampy country, usually appear only in small numbers and are reported to have increased little in the past 20 years.

In 1965, wild pigs were reported from the foothills of the Darling Scarp in the Swan district but the report was not substantiated. In 1968, a herd of about 20 animals were seen at Swan View and, in 1969, some were present in the John Forrest National Park.

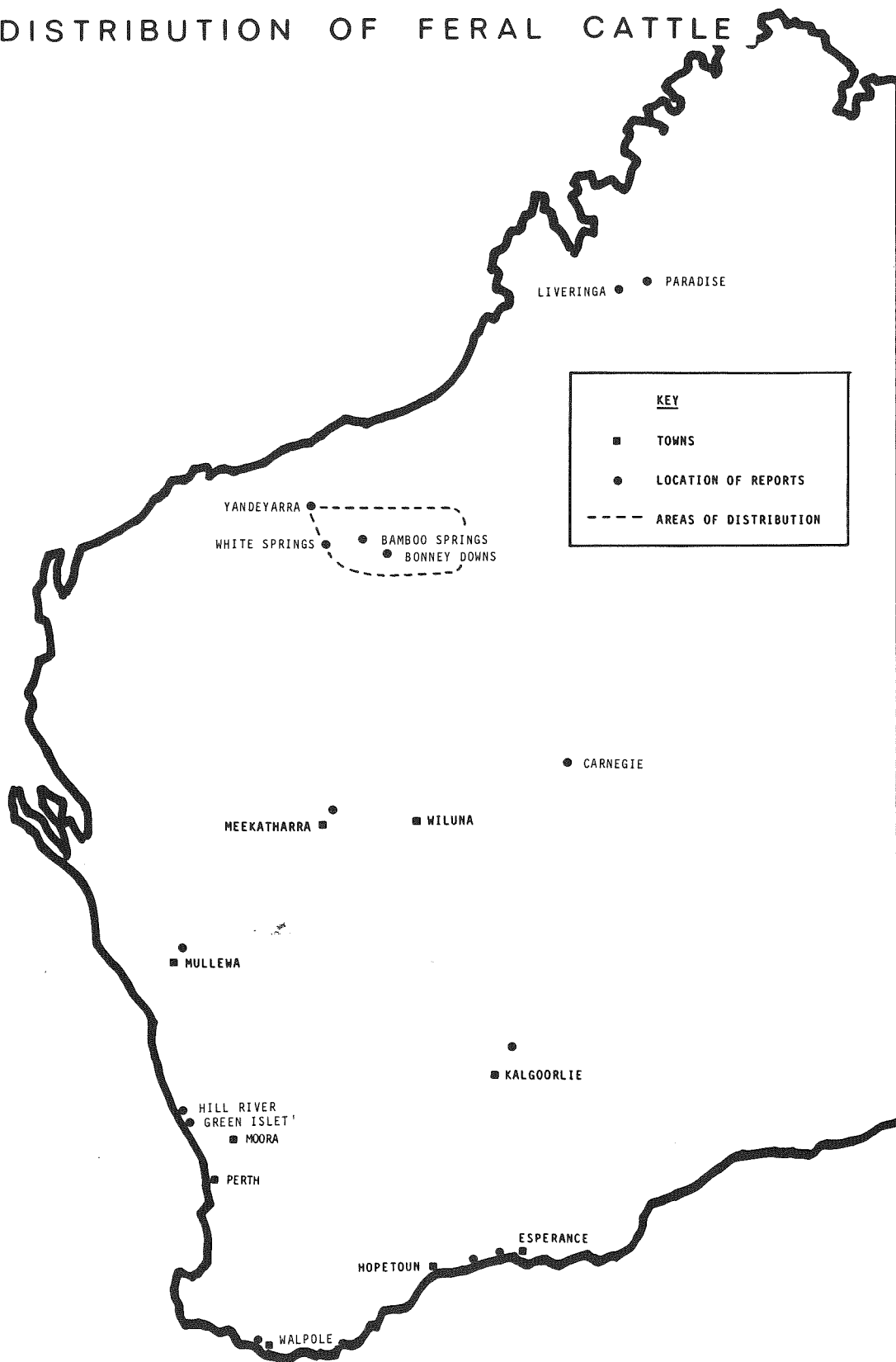
Cattle (*Bos taurus*)

Cattle are from time to time reported as feral animals, particularly in the pastoral areas of W.A. Escapes have occurred, probably since the late 19th. century, but few feral cattle were reported before 1950.

DISTRIBUTION OF FERAL PIGS



DISTRIBUTION OF FERAL CATTLE



Feral cattle have been found in the Kimberleys, Pilbara, Meekatharra, Wiluna and Goldfields areas and in the south west (Long, 1968).

Herds of up to 30 cattle were sighted on two sheep stations along the Fitzroy River in the Kimberleys in 1956. Cattle were also reported from four stations in the Pilbara in 1960-64 where large mobs apparently existed in 1959. Approximately 500 were estimated to be in the Meekatharra area in 1960, and 3,000 were reported in the Carnegie area east of Wiluna. Some cattle were reported in areas north of Kalgoorlie in 1960.

In the south-west, they have been reported around Oldfield-Munglinup (70 miles west of Esperance) and in coastal areas near Walpole in 1960. North of Perth they were reported in coastal areas near Moora, between Hill River and Green Islet and north of Mullewa. Generally numbers are few, but occasionally 40 or more cattle are seen in a herd.

Horse (*Equus caballus*)

Horses occasionally escape or are abandoned in W.A. and breed in the wild. They are present in a number of places in the pastoral and coastal areas of the State (Long, 1968).

They were reportedly numerous on stations in the East Kimberleys adjacent to the Northern Territory border in 1959. Timor ponies have been living in the wild since the early 1840s and brumbies (Australian wild horse) since the 1870s in the Northern Territory (Letts, 1964). Some herds have probably existed in W.A. since the early colonial era.

In the pastoral areas wild horses have been reported on many stations from Nullagine in the north to Esperance in the south. The largest area of distribution appears to be from Juna Downs and Mt. Vernon in the west, to the Canning Stock Route (see map).

There were an estimated 4,000-5,000 wild horses in this area in 1960. Also in 1960, the following estimates were given by Shire Councils:- Meekatharra 500, Leonora a few, Shark Bay 150-200, Upper Gascoyne a few, Sandstone a few, Norseman 200-300 and the Wiluna area various reports from a few at Granite Peak to 500 near Carnegie.

In the south west, feral horses were reported in 1960 from coastal areas near Esperance including Cape Le Grande, Pink Lake and Fleming Grove.

Also in 1960, 100 horses were estimated to be in coastal areas between the Moore River, Cockleshell Gulley, Green Head, and Eneabba.

In the lower south-west horses have been reported from the western portions of the Brookton and Pingelly shires, north of Wandering, in the Boddington shire, north-east of Collie and at Tone River south-east of Boyup Brook. Numbers are small and up to six at a time have been sighted at Collie. In 1969 some were seen in the coastal area south of Jerramungup.

SPECIES WHICH MAY BE ESTABLISHED OR BECOME FERAL OCCASIONALLY

Red deer (*Cervus elaphus*)

Red and fallow deer were presented to the State by Her Majesty, Queen Victoria and were kept in the Zoological Gardens, South Perth (le Souef, 1912). Their progeny were liberated near Albany (Kingsmill, 1920) at Cape Leeuwin (le Souef, 1912; Kingsmill, 1920), and in an unoccupied tract of land between Pinjarra and Rockingham (Kingsmill, 1920). In 1899 a pair were released at Cape Leeuwin (Bentley, 1967; Allison, 1969). Four deer were released on an estate near Pinjarra in 1903 and had built up into a herd of 30 by 1912 (le Souef, 1912).

Further introductions were made in this area around 1908 (Kingsmill, 1920) and on the property of Mr. D. Paterson "Creaton", Pinjarra in about 1915 (Bentley, 1967). The Cape Leeuwin population was initially successful and was apparently thriving 2-3 years later (Bentley, 1967; Allison, 1969) and in 1912, was "multiplying at a gratifying rate" (le Souef, 1912).

Red deer were said to have failed at both Albany and Cape Leeuwin by 1920 (Kingsmill, 1920) although others (Bentley, 1967) place their decline in this area between 1924 and 1930.

From the 1908 release at Pinjarra it was reported (Kingsmill, 1920) that a herd numbering more than 150 head had been established by 1920. Later, (Colebatch, 1929) it was reported necessary to destroy many deer in an area 50 miles south of Perth, as they came into cultivated land.

Other introductions of red deer certainly occurred in W.A. In the period 1903-6 several varieties of deer probably including red deer, were transported to the Porongorups (Bentley, 1967). Numarracarra, near Geraldton, ran red deer and other species in the early 1900s (Allison, 1969)

and some deer were liberated at Gingin (Bentley 1967).

Red deer from Werribee Park, Victoria, where they had been established since 1900, were imported to W.A. (Bentley, 1957) for release at Pinjarra some time early in the 1900s.

Although red deer became established they have not been entirely successful. In 1956-57 it was recorded that few were still present (Bentley, 1957; Glauert, 1956). One was shot in 1960 at Pinjarra, but since then there have been few reports of their presence. They are apparently (Allison, 1969) still found occasionally around Pinjarra, Waroona and Harvey and a number were reportedly shot in the Menzies area and south of Coolgardie in the 1960s.

Blackbuck (*Antilope cervicapra*)

Before 1912 (le Souef, 1912) Indian blackbuck or antelope were selected for introduction to dry country "to which they quickly became adapted". They were introduced to W.A. apparently about 1900 (Allison, 1970) or late last century (Bentley, 1967). They were reported to have been liberated at Kojarena, Wiluna, Roelands (Bentley, 1967) and Numarracarra (Allison, 1970; Bentley, 1967).

In 1920, (Kingsmill, 1920) blackbuck were reported to have established themselves in Murchison country, and a small but steadily increasing herd was frequently seen near Wiluna. In 1929, it was reported (Colebatch, 1929) that blackbuck released 300 miles north of Perth had become so well established that they required thinning out to prevent them becoming a nuisance. They were still present on Numarracarra after the second World War (Bentley, 1967) when a population of 100-150 animals was reported (Allison, 1969).

Blackbuck were kept at Numarracarra and Coolyala stations about 1960 (Tomlinson, 1965) and protected by the managers of these properties. This population was strictly confined and many were said to have been killed by poisoned oats used for rabbit control. They were decreasing in numbers and were in danger of being wiped out. Recently a population of 30 blackbuck was reported at Kojarena (Roberts, 1970).

Ferret (*Mustela furo*s)

Ferrets occasionally escape from rabbiters and from time to time are found living in the wild. One was reported in the Cunderdin area (80 miles E. of Perth) in the late 1950s, and, more recently, a

small colony was found established near commercial poultry yards at Wanneroo (Perth suburb). It is not usually known how long these ferrets have been living in the wild and there appears to be no record of them breeding in the wild in W.A.

Dog (*Canis familiaris*)

It has been suggested that "there is always a steady drift of domestic dogs going wild to swell the ranks of dingoes in W.A." (Tomlinson, 1955). The extent to which the two cross breed in nature is not known, but they will mate and produce fertile hybrids in captivity (Gooding, Pers. comm.).

Feral dogs have been reported as preying on domestic stock in W.A. at least since 1916 (Crawford, 1916). They frequently cause concern in areas north of Perth and in the outer metropolitan area. In the late 1950s a number were reported killing sheep in the Wattle Grove-Forrestfield area and in 1969 were reported to be killing sheep in the Kelmscott area.

Buffalo (*Bubalus bubalus*)

Water buffalo were brought to Australia between 1824 and 1886 (Letts, 1964; Tulloch, 1969). When the settlement at Port Essington in the Northern Territory was abandoned in 1849 buffalo were apparently left behind. These are thought to have spread over the sub-coastal plains and adjacent areas of the Northern Territory (Tulloch, 1969), and some have crossed the border into W.A. They have been reported in the north-east Kimberleys north of latitude 16 deg. S.

In 1958, one was sighted near Fossil Downs station and in March, 1970 two were reported from Meda station in the West Kimberleys. Sightings are rare and it is doubtful whether the animals are well established in the area.

Sheep (*Ovis aries*)

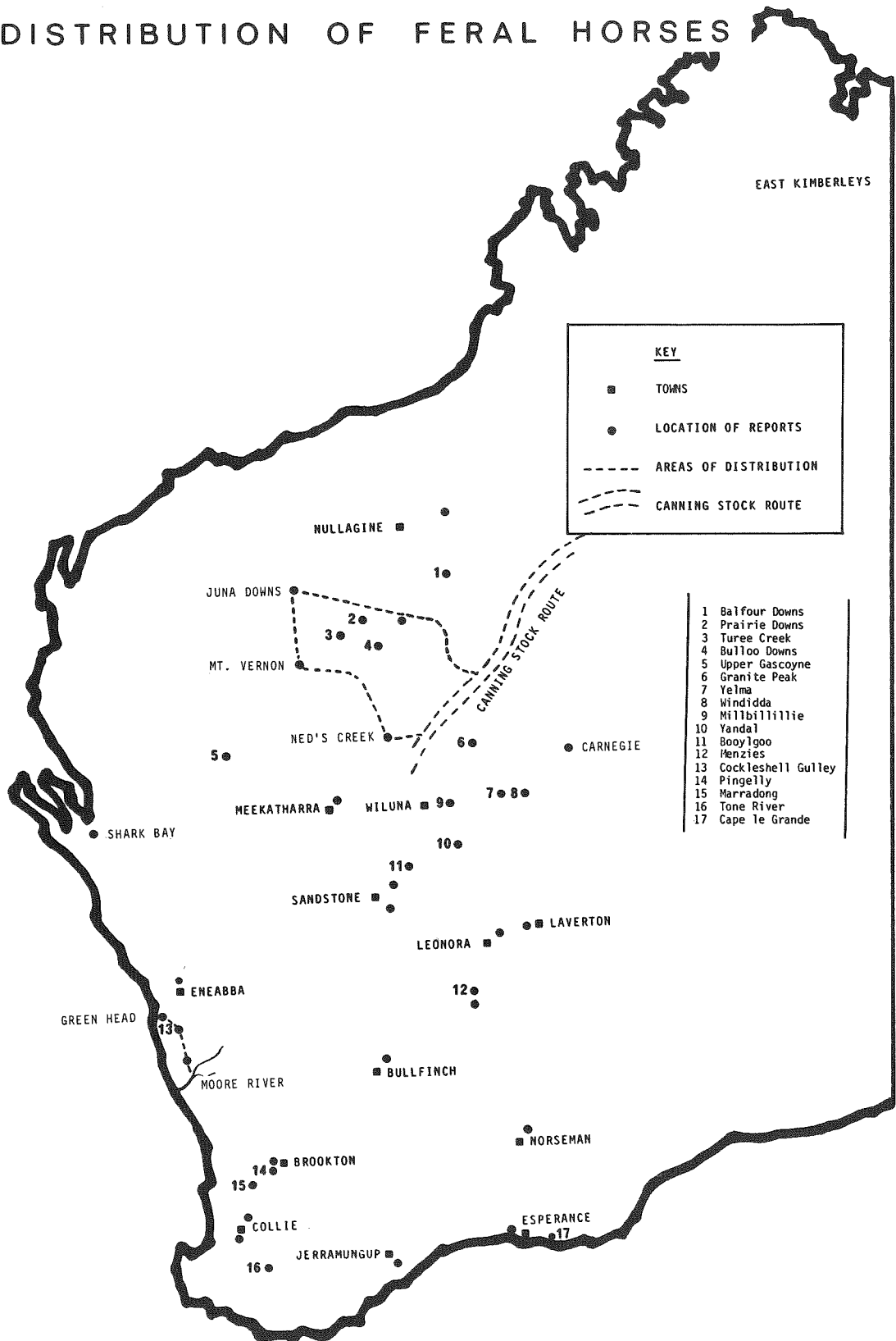
Sheep occasionally become feral near pastoral leases but very few have been sighted. It is doubtful whether they survive in the wild for any length of time.

SPECIES WHICH HAVE FAILED TO BECOME ESTABLISHED

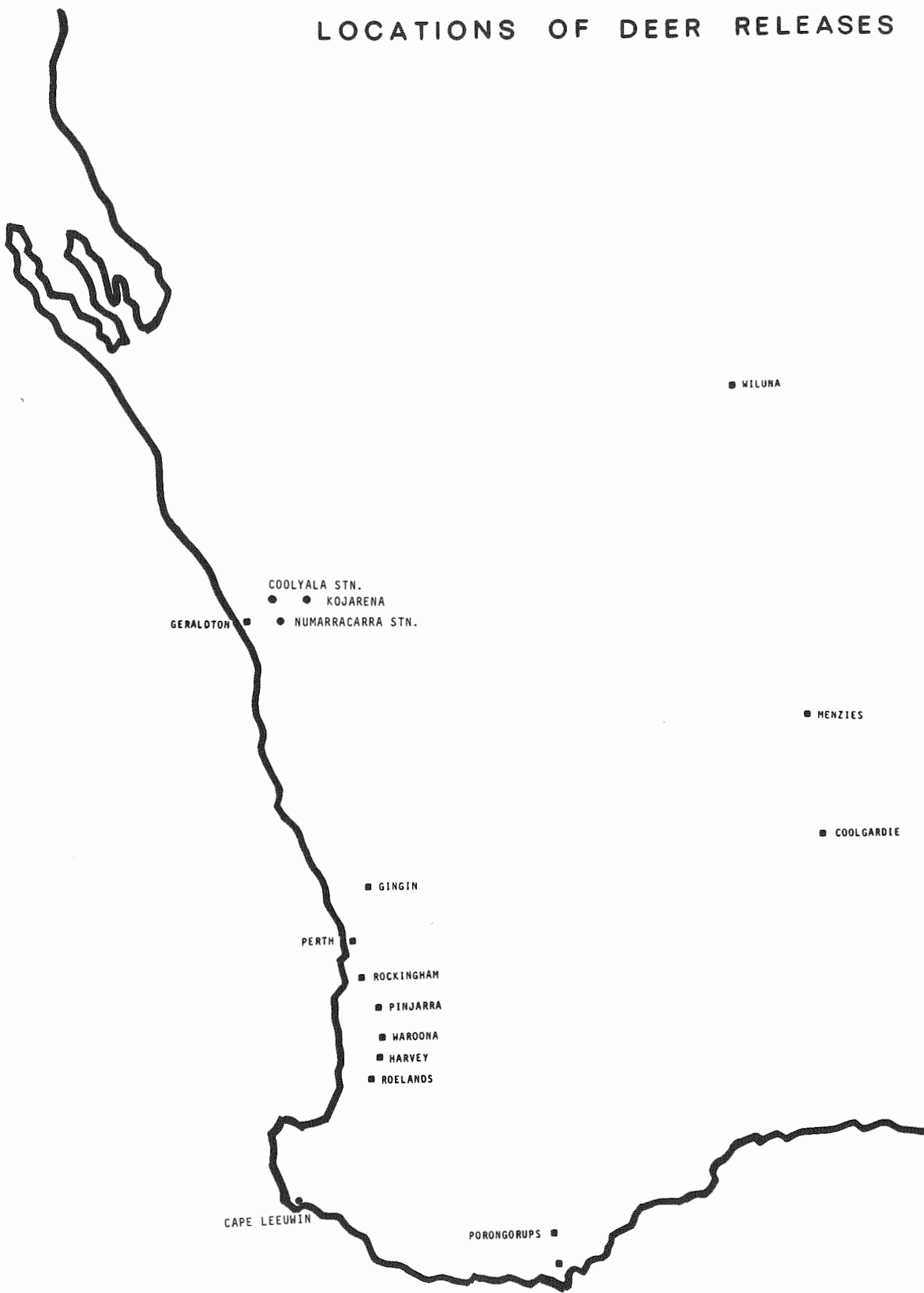
Hare (*Lepus europaeus*)

The Government was urged in 1898 to "again be impressed with the dangers attendant upon the

DISTRIBUTION OF FERAL HORSES



LOCATIONS OF DEER RELEASES



introduction of hares" (Lindley-Cohen, 1898(c)). It is not recorded whether any hares were actually released in the wild and there are none now established in W.A. although they are present in the Eastern States.

Fallow deer (*Dama dama*)

Fallow deer were presented to the State at the same time as red deer. They were kept in the Zoological Gardens, South Perth, and their progeny, a pair, liberated (le Souef, 1912) in the Cape Leeuwin area in 1899 (Bentley, 1967; Allison, 1969). Apparently three or four liberations occurred at Leeuwin (Bentley, 1957) and in 1914-18 they were said to be still thriving in the area. Fallow deer were also liberated at Gingin but died out (Allison, 1969).

There appear no further records of these deer except for reports in 1929 (Colebatch, 1929) and in 1956 (Glauert, 1956) that they had met with little success.

Hog deer (*Axis porcinus*)

Small hog deer were introduced before 1912 and were apparently released into swampy country in which they thrive (Allison, 1969; le Souef, 1912). A pair were liberated at Cape Leeuwin with other deer species, in 1899 (Bentley, 1967). They may have been included in several varieties transported to the Porongorups. In 1956 hog deer were reported to have been unsuccessful in establishing themselves in W.A., (Glauert, 1956).

Sambar deer (*Cervus unicolor*)

Sambar deer are reported (Bentley, 1957) to have been released in W.A. but there appear to be no records of where or when. None are established in the wild.

Rusine deer (*Cervus timoriensis*)

Rusine deer were liberated by the Acclimatization Society in W.A. but apparently had little success (Glauert, 1956). A pair were liberated at Cape Leeuwin in 1899 (Bentley, 1967), possibly thrived for a while but then died.

Eland (*Taurotragus spp.*)

A pair of eland were presented to the Acclimatization Committee at the instance of His Excellency the Governor, Sir G. Strickland, by the Duke of Bedford (le Souef, 1912). These were kept in the Zoological Gardens, South Perth, and the young were to be used for acclimatization.

Some were apparently released as, in 1929 elands were said to have failed because of native poison plants (Colebatch, 1929). In 1956 (Glauert, 1956) those released in earlier years were again reported to have met with little success.

African buffalo (*Syncerus caffer*)

African buffalo were introduced to W.A. (Allison, 1969 & 1970) apparently about 1900 but died out.

Zebra (*Equus sp.*)

Zebra were also introduced to W.A. about 1900, but died out (Allison, 1969 & 1970).

Vicuna (*Vicugna vicugna*)

Introduced to W.A. about 1900, vicuna also died out (Allison, 1969 & 1970).

Llama or Guanaco

Although some confusion appears to exist, it was probably the llama (*L. peruana*) which was actually liberated in W.A. about 1900 (Allison, 1969 & 1970). This species also failed to become established.

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