Biological Survey to Salisbury Island

▲ Limestone cliffs on the west side of Salisbury Island. (Photo A. A. Burbidge.)

The Recherche Archipelago, a group of over 100 islands off the south coast of Western Australia, has long been recognised as an area of extremely high nature conservation value. Many of the islands hold particular importance because of the presence of small populations of terrestrial mammals, including species or sub-species now rare or extinct on mainland Australia and the presence of significant seabird and seal breeding colonies.

For this reason, the whole of the Recherche Archipelago is included in a Class A reserve, the Recherche Archipelago Nature Reserve, vested in the Western Australian Wildlife Authority in May, 1979. However, because of the large number of islands involved and their difficulty of access, many of the islands have not been adequately surveyed. One such island was Salisbury Island.

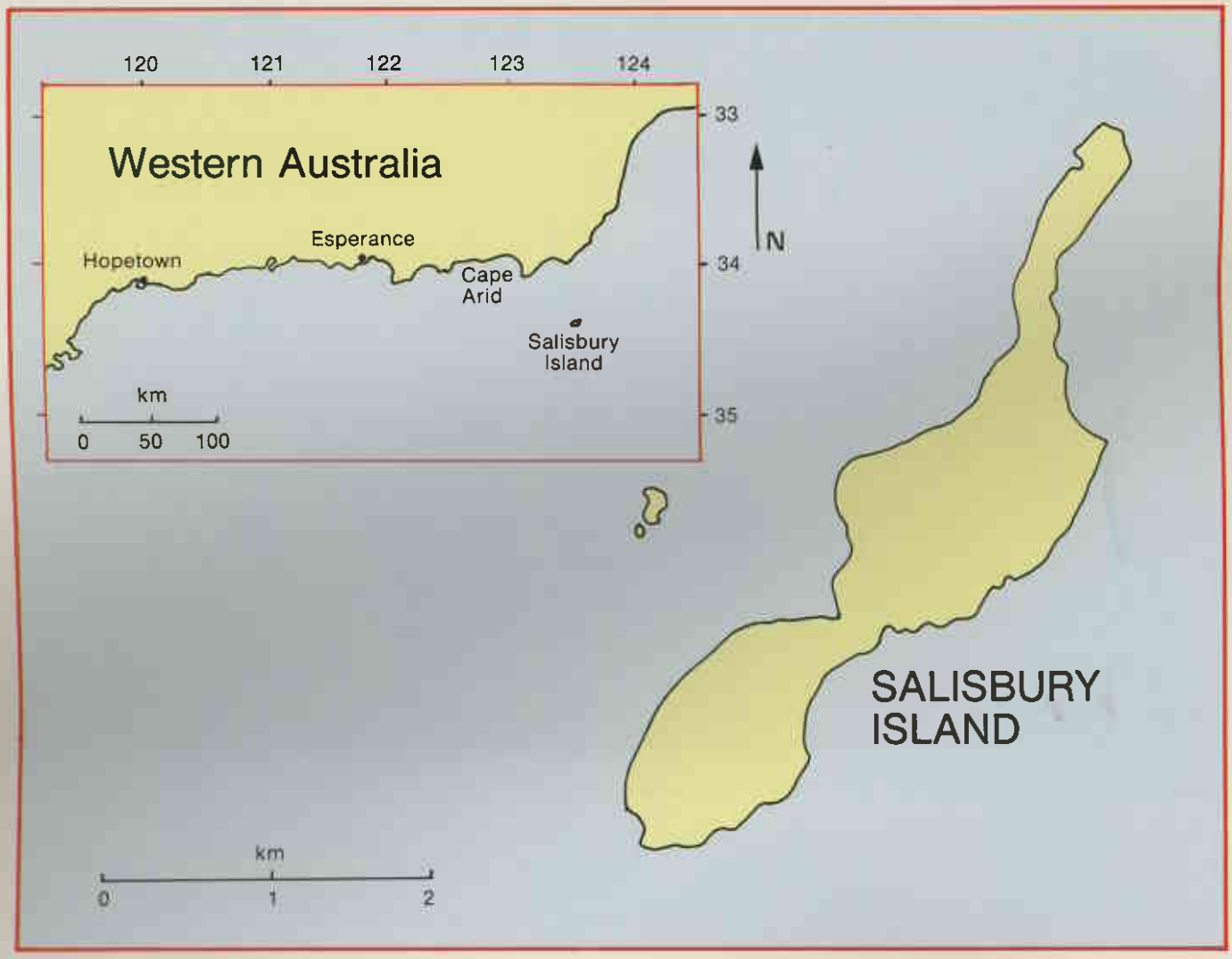
Salisbury Island, having an area of about 320 hectares, is the third largest island in the Archipalego. Despite its size, until the beginning of this year there were only two recorded visits to the island by biologists. The first was during the Australian Geographical Society expedition to the Recherche in 1950 and the second by Dr. I. Abbott and Dr G. Maynes in 1977. Both visits were for only a few hours duration and were confined to the northern end of the island.

This state of affairs changed this year in response to two mineral claims covering Salisbury Island which were lodged under the Mining Act in late 1980. These claims were for guano, phosphate and limestone rock. On their receipt, the Western Australian Wildlife Authority and the Conservator for Wildlife lodged objections to the claims with the Wardens Court and arranged for the Department of Fisheries and Wildlife to examine the island's plants and animals and assess possible impact if mining were to proceed.

Accordingly, in late March this year, a party from the Western Australia Wildlife Research Centre attempted to land on Salisbury Island from the sea. However, after one attempt which was unsuccessful due to stong winds and rough seas, and after talks with local professional fishermen experienced in the waters around the Archipelago, it was decided that although a landing could be made on the island in calm weather, it would be difficult to land and retrieve a large party of scientists and their equipment to any schedule. In other words, attempts to reach the island by sea were abandoned.

The journey across to the island was finally made by helicopter from the mainland at Cape Arid, 40 kilometres away. The party, consisting of Dr Andrew Burbidge, Dr Jack Kinnear, Mr Norm McKenzie and Mr Phil Fuller, set up camp on the crest of the island on April 15th and departed four days later on April 19th.

Before discussing the results of the party's work, some brief notes on the island's history may be useful. The first European to sight the Archipelago was Pieter Nuyts in 1627. Further visists were made by Vancouver in 1791, D'Entrecasteaux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in 1792 and Mathew Flinders in 1802 but during this period there is no record of anyone landing on Salisbury Island. However, by 1825 sealers were operating throughout the islands of the Recherche and this continued until 1892 when seals were legally protected. One further year of sealing was permitted in 1920. Salisbury Island was almost certainly visited by sealers during this period but the lack of a sheltered anchorage, good campsite or fresh water would not have encouraged them to stay. In 1894 the island was the scene of a dramatic rescue after the *Rodondo,* a ship of 1 000 tonnes, struck a nearby reef while bound for Fremantle. The 196 passengers and crew made their way to the island from where they were eventually rescued by the schooner *Grace Darling.*

Salisbury Island was named by Commander J. W. Combe who carried out a hydrographic survey of the Recherche in 1900-1901. However, the origin of the name is unknown.

Salisbury Island is about 5.2km long. It is fairly narrow (see map) being about 1.3km across at the widest point, reducing to 200 metres at the narrow neck and 150 to 300m across the northern peninsula. The long axis is aligned in a north-east south-west direction.

Except for the northern peninsula and the southern peak the island consists of an undulating, high limestone plateau with steep cliffs. It is highest in the centre of the island, north of the narrow neck, where it reaches 120m. The northern peninsula is mostly limestone but it is much lower. The southern peak, which reaches 100m, and its surrounds, consist of a Proterozoic migmatite, composed of granite rocks, metamorphosed basic rocks and minor schists and quartzites. The migmatite extends northwards and is exposed as a fringing platform surrounding most of the island, one to five metres above sea level and up to 40 metres wide.

The recent interest in the island's phosphate reserves is not new as a visit was made to the island during World War II for the same purpose.

▲ Steep migmatite slope at southern end of Salisbury Island. (Photo A. A. Burbidge.)

However, Dulfer, who led the search in 1943, was not impressed with what he found.

"The narrow beds of low grade phosphate found in the cliff face at Salisbury Island are not encouraging in quality. To determine the quantity available a large amount of tunnelling or drilling would be necessary. If substantial deposits exist, the grade needs to be comparatively high to offset the high cost of underground mining, shipping facilities and probably delays to shipping due to unfavourable seas, of which we had good evidence during our visit to the Archipelago."

Salisbury Island is separated from the mainland coast by a broad channel 45 fathoms (82m) deep. Based on current knowledge and understanding of sea levels, this would indicate that the island was isolated at least 13 000 to 14 000 years ago. Compared with channel depths separating a variety of other large islands within the Archipelago it is evident that Salisbury was separated before any other major island. Thus it could be expected to find greater genetic differences in resident species on Salisbury Island than on other islands in south-west Australia when compared with mainland populations.

Which brings us back to the results and observations of this year's survey party.

▲ Black-flanked rock-wallaby *(Petrogale lateralis)* on Salisbury Island. (Photo A. A. Burbidge.)

▼ New Zealand Fur Seals *(Arctocephalus forsteri)* females and pups on Salisbury Island. (Photo A. A. Burbidge.)

The vegetation on the island varied between dense heath, open grass and sedges and "meadows" of dwarf scrub and succulent mat plants. Prior to this year's visit, 28 species of plants were known to occur on the island. This was increased to 39 species and doubtless collecting in a more favourable season, especially spring, would yield more species. So far, all the work on the island has been carried out in summer or autumn.

However, the most important find on the island was the extent of its mammal population.

Although the first record of Black-flanked Rock-wallabies *(Petrogale lateralis)* on Salisbury Island resulted from 1894 when survivors from the *Rodondo* caught the animals for food, this record was overlooked by scientists until the species was rediscovered by the 1950 Australian Geographical Society expedition, and even then, little was known of the population. The 1982 survey made counts of the rock-wallabies on the island both by day and, with the aid of a spotlight, at night. Daytime counts consistently produced higher numbers and these were used to calculate the size of the population. After counting in the migmatite area as well as the limestone area, the survey estimated the population of the whole island to be 249 animals. An accurate count proved difficult as visibility was a major problem on the island, particularly on the limestone area. There, the vegetation was extremely dense and there were a number of deep caves in the cliffs.

In addition to their numbers, the Salisbury Island rock-wallabies were in excellent condition despite conditions on the island which indicated that little or no rain had fallen during the summer preceding the party's visit.

The status of the Salisbury Island rock-wallaby population may have important implications for the survival of this species throughout Western Australia. The Black-flanked Rock-wallaby is confined to this state, occuring on the mainland in the Cape Range, in the Murchison

River Gorge at Kalbarri, and on granite rocks in the wheatbelt.

Other island populations occur on Depuch and Barrow Islands in the Pilbara. Despite this distribution, the animal is in danger of becoming extremely rare. The Cape Range population has not been studied but both the Kalbarri and wheatbelt populations are declining. In fact, from being a widespread and fairly common animal in the wheatbelt it is now reduced to five small populations totalling between 75-100 animals. These animals lack genetic variability through inbreeding brought about by the low numbers and their only hope of continued survival may be from the introduction of Salisbury Island genes to the mainland in an attempt to produce some hybrid vigour.

A surprise find which had not been previously recorded from the island was a major breeding colony of New Zealand Fur Seals *(Arctocephalus forsteri)*. About 500 animals were counted of which only two were males and about 70 per cent were pups. As fur seals produce only one pup per year, this number of pups would indicate there must have been about 350 females in the colony, many of which were probably in the sea feeding at the time of the count. Based on studies in South Australia, the total size of the Salisbury Island colony may have been in the order of 1 000, consisting of 350 females, 75 to 100 breeding males, 350 pups and perhaps 200 to 250 sub-adult males and females. This would make the colony the largest known breeding colony of fur seals in Western Australia.

In Australia, the New Zealand Fur Seal ranges from Cape Leeuwin in Western Australia to Kangaroo Island and other small islands off the coast of South Australia (see *SWANS* Vol. 12 No. 1 1982).

The New Zealand Fur Seal was heavily exploited by sealers during the nineteenth century and further exploitation was permitted in the Recherche in 1920. Only recently has the species shown any signs of recovery in Western Australia, and it is still an extremely rare animal.

▲ Australian Sea Lions *(Neophoca cinerea)*. (Photo A. A. Burbidge.)

Salisbury Island also provides a breeding place for another of the world's rarer species of seals, the Australian Sea Lion *(Neophoca cinerea)*. Between 30 and 40 were sighted on the island including two pups. The animals, single and in groups, were basking and resting all around the island up to 300m from the sea and 50m above sea level.

Other fauna observed on the island during the survey included a genetically unique population of the Southern Bush Rat *(Rattus fuscipes)* and an undescribed subspecies of lizard. Altogether, nine species of reptiles were collected from the island including two species of geckoes, six of skinks and one species of snake. It is likely that additional work would reveal further species as the survey was hampered in this respect by cool weather, dense vegetation and interference by bush rats during pit trapping for small species.

A total of 14 bird species was also recorded during the survey. Of these, five were land birds, two were breeding seabirds and six were sea and shore birds resting on the island. A Yellow-nosed Albatross was seen flying around the island but this species does not come ashore except to breed. Again, further visits may reveal additional breeding sea and shore birds such as the White-faced Storm Petrel, Caspian Tern, Crested Tern, Cape Barren Goose, Little Shearwater, Pacific Gull, Silver Gull and Sooty Oystercatcher.

Although much work remains to be done on the island, this year's survey highlighted the importance of Salisbury Island in more ways than one. It not only harbours the only insular population of the Black-flanked Rock-wallaby south of the Pilbara and the only one known to have genetic diversity, it also is the site of the largest known breeding colony of the New Zealand Fur Seal in Western Australia. The island is also an important seabird breeding area and, in addition, would provide a valuable scientific laboratory for studies on such subjects as island biogeography, rates of evolution and changes in species diversity following separation from the mainland, as well as broader ecological work.