

# Studies on Middle Island in the Recherche Archipelago

by A.J.M. Hopkins

Islands have long held a special and romantic appeal for people, being imagined as places of untouched beauty with secluded white beaches fringed with palm trees, populated only by shipwrecked sailors and native fauna. But for biologists they represent more than that. At least since the time of A. R. Wallace and Charles Darwin, whose studies in the Malay Archipelago and the Galapagos provided the embryo for the rebirth of biology as a science, the evolutionary significance of island biotas has been recognised.

Western Australia's offshore islands provide a number of unique opportunities for research biologists. In addition to the evolutionary studies many islands are the last repositories of plants and animals now extinct on the mainland. They provide landing/roosting and breeding sites for seabirds and seals and sealions, and breeding sites for marine turtles. Many Western Australian islands have been surveyed to provide the basis for island biogeographical studies, the results of which have been applied in assessing optimum size for conservation reserves. Some have also been studied as simplified natural laboratories, of which the prime example is Rottnest Island. Together these studies have provided valuable insights into natural ecosystem processes which have been used to better reserve and manage the biological resources of the mainland.

Recent studies on Middle Island provide a good example of how the integration of information from a number of concurrent studies of the ecosystem have contributed to a clear understanding of the processes of that biological system. These studies began in 1973 after a severe summer wildfire burnt about half the island. Members of the W.A. Wildlife Authority expressed concern about the impact of this fire, and staff from the W.A. Herbarium, the W.A. Wildlife Research Centre and several other institutions collaborated to study the effects of the fire on the island's flora and fauna.

Middle Island (34° 06'S, 123° 11'E) with an area of

approximately 11 square kilometres is the largest island in the Recherche Archipelago Nature Reserve and has a more varied geology, topography and coastline than any other island in the group. The island lies 9km to the S.S.E. of Cape Arid and is about 130 km by sea to the east of Esperance. At the western end of the island, granite rocks form an elongate hill, Flinders Peak (174m). Limestone, which overlies the granite in the central part of the island, forms 50m high cliffs around the southern bays. These bays, and those on the north coast with their white sandy beaches, are a prominent feature of the island. So too is Lake Hillier, a pink brine lake on the north-eastern part of Middle Island and separated from the sea by a steep narrow sand-dune.

As a result of the recent biological work, the list of vascular plant species recorded on the island now exceeds 230 and 20 plant associations have been recognised and mapped. The fauna includes 12 species of reptiles and amphibians, 37 bird species (17 resident, 18 migratory) and one terrestrial mammal, the Tammar (*Macropus eugenii*). A skull of the Southern Bush-Rat (*Rattus fuscipes*) has also been found. Seals and sea-lions probably utilized Middle Island before the place became a sealers camp but only sea-lions have since been seen in nearby waters.

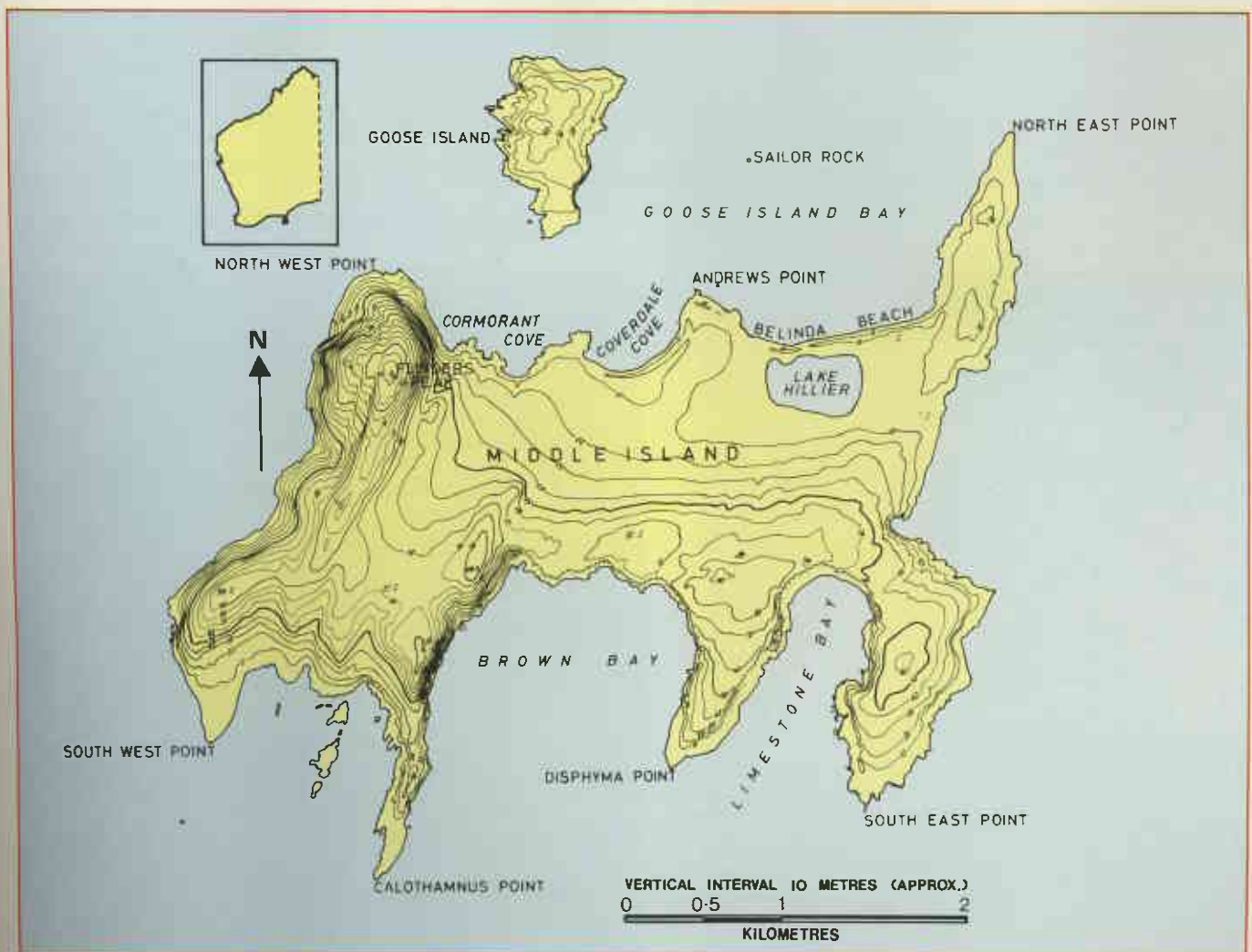
The first recorded visit to Middle Island was made by Mathew Flinders in the *Investigator* in January, 1802 while he was en route

▼ Breeding colony of Blackfaced Cormorants *Phalacrocorax fuscescens* at the base of Flinders Peak (Cormorant Cove).





▲ Flowers of *Alogyne hakeifolia* overlooking Middle Island's pink lake.



from England to Sydney. He was accompanied by the noted botanist Robert Brown who explored the island and made collections over a period of 2½ days. Flinders revisited the island in May, 1803 during his circumnavigation of Australia, for the purposes of "cutting wood, boiling down seal oil and killing geese". He also buried his boatswain, Charles Douglas, and seaman, William Hillier, and abandoned two anchors which have only recently been found and retrieved. A subsequent important plant collection was made by Allan Cunningham in 1818 while he was travelling with P.P. King and J.S. Roe aboard the *Mermaid*.

The island was apparently not visited again until the 1820s when sealers and whalers began operating throughout the archipelago. One of the first boats to sail from Sydney was the brig *Belinda* which was wrecked on Middle Island in July, 1824, and her 26 surviving crew spent 5 months there before being rescued.

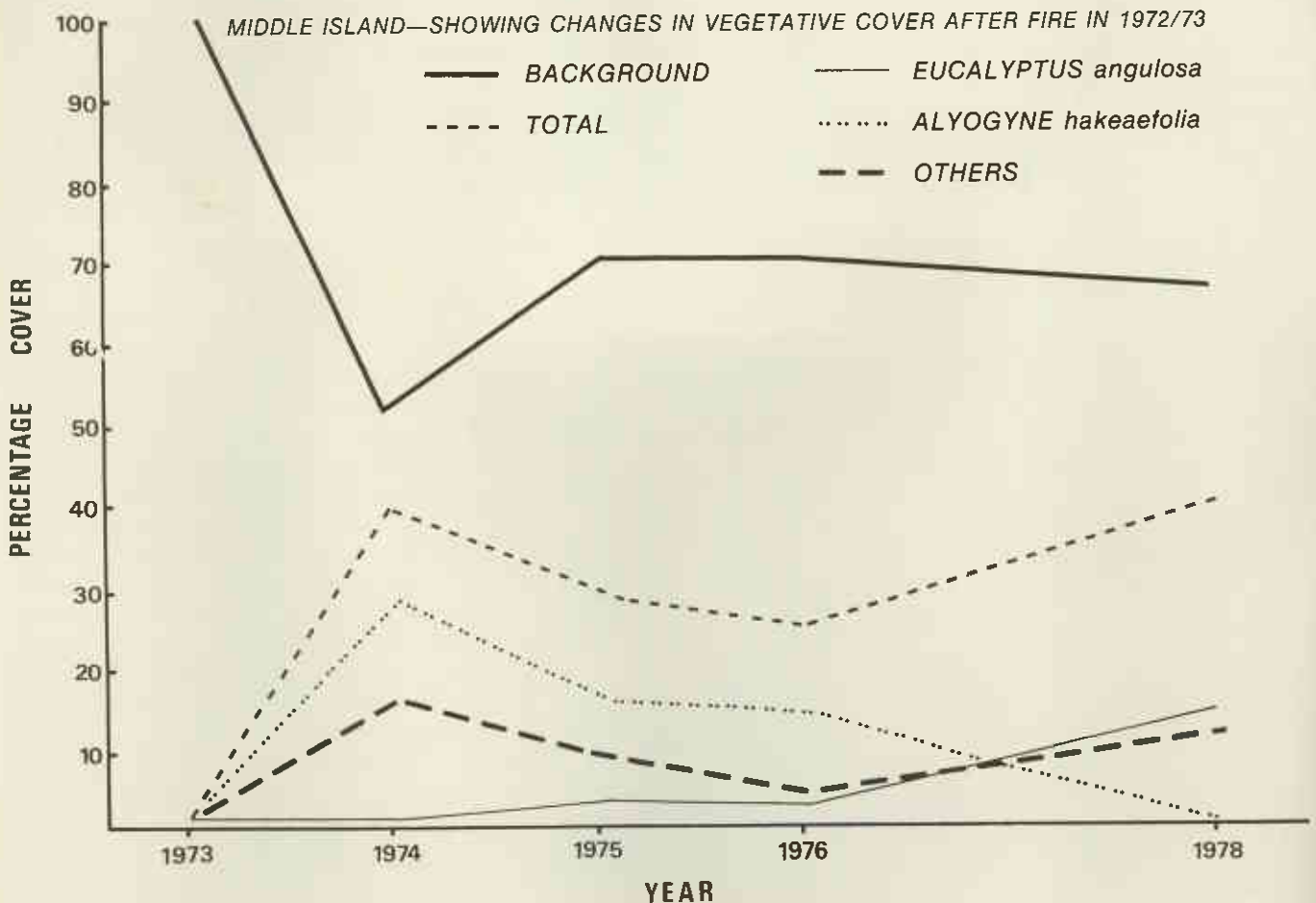
The island later became the centre of sealing and whaling operations in the archipelago. Cruise built stone houses and gardens and the island became widely known as the "Right Whale station of the bight".

The industry declined and occupation of the island is thought to have ceased by the 1850's. Between 1899 and 1905 the pink lake was mined for salt and a number of pastoral and agricultural ventures were also proposed but there is no evidence that these came to fruition. The crew of the Fisheries Research Vessel *Penguin* which was blown ashore in 1920, and later, the salvage team, stayed for short periods but otherwise the island has remained relatively undisturbed until the present. The pastoral lease was cancelled in 1958 and Middle Island was included in the Recherche Archipelago Nature Reserve later that year.

A comprehensive biological survey of 20 islands of the archipelago

including Middle Island was made by an Australian Geographical Society expedition team in 1950. This party included J. H. Willis (botanist) and V. N. Serventy (zoologist). Willis made a particular point of searching for the species first collected by Robert Brown but he failed to locate them all. Among those he failed to find were *Alyogyne hakeaefolia*, *Gyrostemon sheathii*, *Hibiscus huegeli*, *Scaevola aemula*, *Solanum simile* and *Villarsia parnassifolia*. **YET ALL SIX OF THESE SPECIES HAVE BECOME PROMINENT COMPONENTS OF THE FLORA ON MIDDLE ISLAND IN THE PAST 10 YEARS. WHY WERE THEY MISSED?**

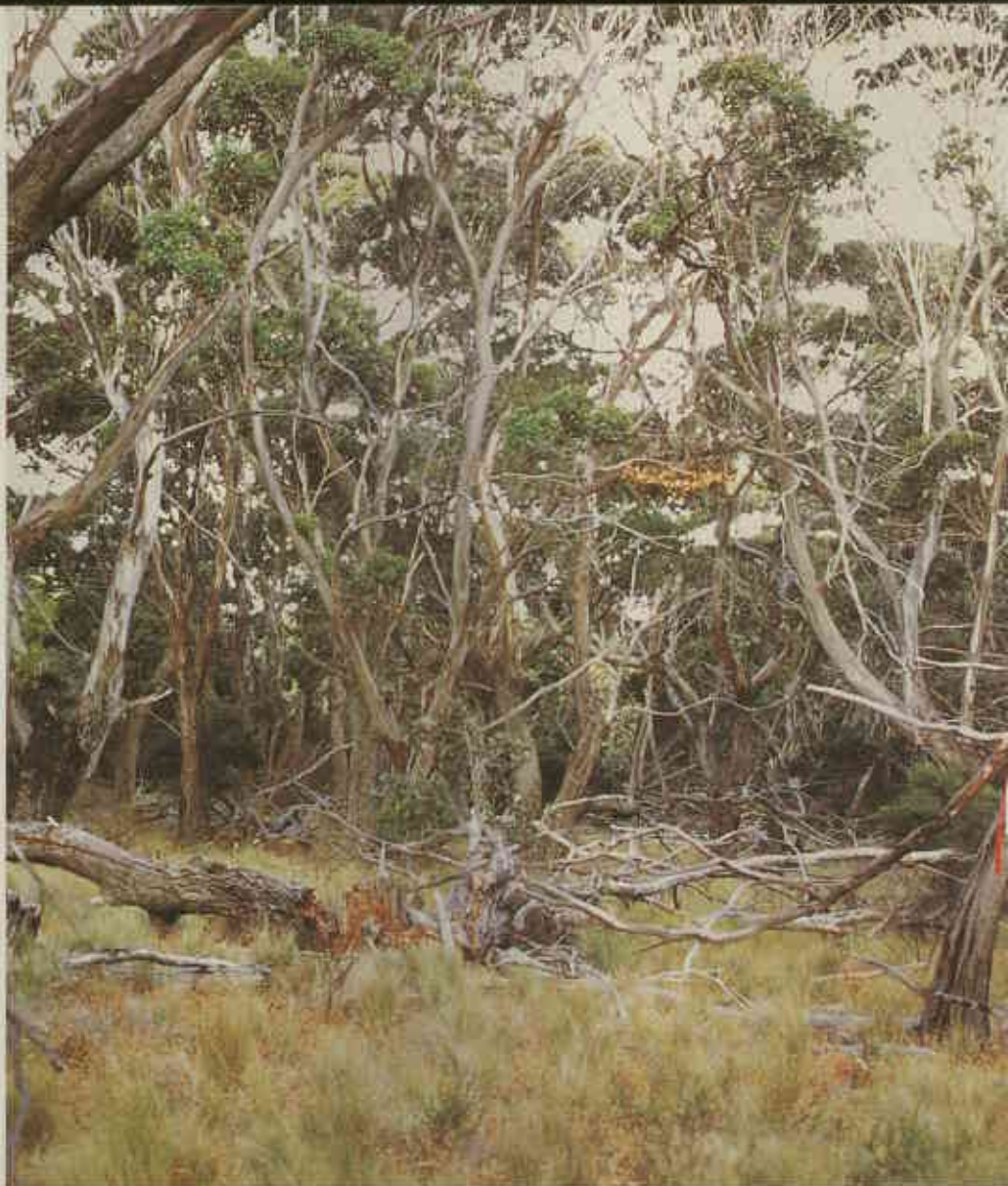
The answer which has come from the recent studies is that these species are fire ephemerals, species with very durable seeds which persist in the soil and germinate in great numbers after a fire. The species are mostly short-lived herbaceous perennials, growing to 2m tall in 2-4 years,



flowering profusely and then dying off. The evidence suggests that Middle Island had been burnt 2-3 years before Brown's first visit and not again until the summer of 1972-73.

The importance of Middle Island as a study site was thus recognised—an island site having an insular but reasonably well documented biota covering a recently burnt area and a long unburnt area. The scope of the studies was broadened to include an examination of the unburnt vegetation and the relationship of the macropods to the two ages of vegetation.

Five vascular plant species collected by Brown or by Willis (in 1950) were not recorded again and reckoned to be extinct, but at the same time some thirteen immigrants were recorded. These rates of



▶ A long unburnt example of *Eucalyptus angulosa* open forest 14m high with a mid-storey of *Melaleuca lanceolata*, and abundant *Poa* tussocks on the ground.

▼ *Hakea suaveolens* which is common on the islands of the Recherche Archipelago.



▼ *Kunzea baxteri*.





▲ Unburnt *Acacia rostellifera* open scrub with shrubs of *Pimelea* spp present and *Poa* tussocks on the ground. The *Acacias* were found to be dying and regenerating in patches. The effect of the 1977 fire on Middle Island on this vegetation type is shown below. ▼



▼ Two years after the 1977 fire, regeneration is slowly taking place.



immigration and extinction are consistent with those calculated for the island using island biogeographic theory. Extinctions in the flora were not excessive in the absence of fire for ca. 170 years. The six herbaceous perennial species listed above had apparently persisted for that period as seeds in the soil while the remaining extant species had persisted either through longevity of the established individuals or by regenerating in the absence of fire.

Of the twenty plant associations recognised on Middle Island, some have not been recorded for the mainland. In particular the vegetation on the island is taller (eg. *Eucalyptus angulosa* forest to 18m) with a more open, grassy understorey. This reflects a gradual thinning of the woody perennial shrubs with a concurrent increase in abundance of grass (*Poa* spp.) over time since last disturbance. The absence of these tall vegetation associations with open understoreys on the adjacent mainland probably reflects the relatively high evidence of fire there over the past 150 years.

The vegetation is regenerating vigorously after the 1972 fire although the boundaries of some of the plant associations appear to be altered by the fire, particularly by the elimination of physiognomic dominants by burning.

The terrestrial fauna does not seem to have been adversely affected by either the absence of fire for 170 years or the fire of 1972. No extinctions have been recorded and the tammar wallabies (*Macropus eugenii*) did not appear to utilize the thick regenerating vegetation significantly more than the open unburnt areas for shelter although some of the early succession plant species were heavily grazed.

These studies are continuing despite the fact that a second fire in February, 1977 burnt much of the remaining area of long unburnt vegetation. Whilst studies of aged vegetation are no longer possible, the vegetation after fire will be monitored for at least the next 10 years.