

Sand Island (middle), located in the Nambucca Estuary. There has been no detailed scientific study of the plants and animals on the island; however, observations reveal some interesting biodiversity values.

Photo Mark V Robinson ©



NAMBUCCA ESTUARY

THE BIODIVERSITY VALUES OF THE 'ARTIFICIAL'

SAND *island*



Early hydrographic charts (1891) mapping the navigability of the Nambucca River for vessels of the day indicate that what is now frequently called 'Sand Island' was, in fact, natural sand banks and shoals in estuary waters. By the turn of the century, however, Parliamentary Standing Committees (1898, 1903 and 1913) deemed that training walls and dredging were required in the river, and so the dredge spoil deposited in the area created an 'artificial island'. Over time, vegetation began to colonise the island. An aerial photograph taken in

1942, for instance, shows the beginnings of this process (see Cavanagh, 2006, Nambucca River Estuary Management Study for details). Today, the island is host to more than one hundred plant species, and over seventy native animals.

An aerial photograph of Sand Island (left), taken in 1942, and showing the beginnings of the vegetation colonisation process.

Photo Commonwealth of Australia



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SAND ISLAND *habitats*

Tidal Flats

Where Adjacent to island in Inner Harbour; exposed with tides.

Comments Spoil from initial dredging, and sediment deposited by floods and tides.

Mangroves

- Grey Mangrove (*Avicennia marina*) • River Mangrove (*Aegiceras corniculatum*)

Where Edge of island where sediments meet tides; inundated daily with tides.

Comments Three species of mangrove are known in Nambucca estuary, but only two are present on the island.

Saltmarsh

- Saltwater Couch (*Sporobolus virginicus*) • Austral Seablite (*Suaeda australis*)

Where Adjacent to mangroves; experiences tidal inundation.

Comments Dominated by salt tolerant grasses and saltbush family sub-shrub. This is a *threatened ecological community* (NSW and Nationally).

Swamp Oak Forest

- Swamp Oak (*Casuarina glauca*) +/- • Horsetail She-oak (*Casuarina equisetifolia*)

Where Fringing saltmarsh or across island. **Comments** Can tolerate periodical inundation during floods and/or high exposure of salt laden winds.

This is a *threatened ecological community* (NSW).

False Dune Scrubland

- Coastal Banksia (*Banksia integrifolia*) • Coastal Tea Tree (*Leptospermum laevigatum*)

Where The drier, sandy environments of island.

Comments The shrubs, scramblers, herbs and grasses found here are typical of exposed locations in local beach dune systems. The cover of Coastal Banksia varies from quite open habitats, with a ground layer dominated by grasses, to a more developed scrub with a tangle of woody debris, vines and young rainforest saplings.

Littoral Rainforest

- Tuckeroo (*Cupaniopsis anacardioides*) is common

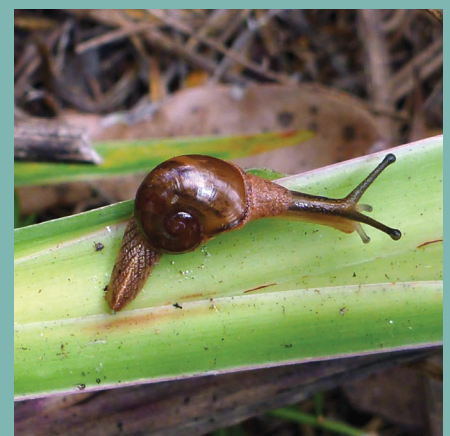
Where Not inundated by tides; exposed environment or sheltered by Swamp Oak or Coastal Banksia. **Comments** Developing habitat; now they are rainforest specimens or small thickets. Over half the native plants species on the island are considered rainforest species. This is a *developing threatened ecological community* (NSW and Nationally).

FAUNA

More than 70 species of native animal have been observed on Sand Island and, not surprisingly given their ability to fly, birds provide the greatest number of species. The Grey-head Flying-fox (*Pteropus poliocephalus*) is expected to forage on the site as they love the nectar of the Coastal Banksia and the rainforest fruiting species that are present on the island. What is remarkable, however, is the presence of a Swamp Wallaby (*Wallabia bicolor*) and bandicoots, ground mammals that were probably washed to the island during floods. Though the full complement of reptiles has yet to be determined, a Red-belly Black-snake (*Pseudechis*

poryphyriacus) and a few Eastern Carpet Pythons (*Morelia spilota mcdowelli*) have been observed to date.

Almost 40% of the island's native plants, and 2.5% of the weed plants, are known food sources for the larval stages of butterflies (caterpillars) with distributions that include the Nambucca River catchment. The terrestrial mollusc, the Fine-speckled Semi-slug (*Stanisicarium virens*), is a surprising resident, which probably reached the island on floating woody debris.



The Fine-speckled Semi-slug (Stanisicarium virens).

Photo Mark V Robinson ©



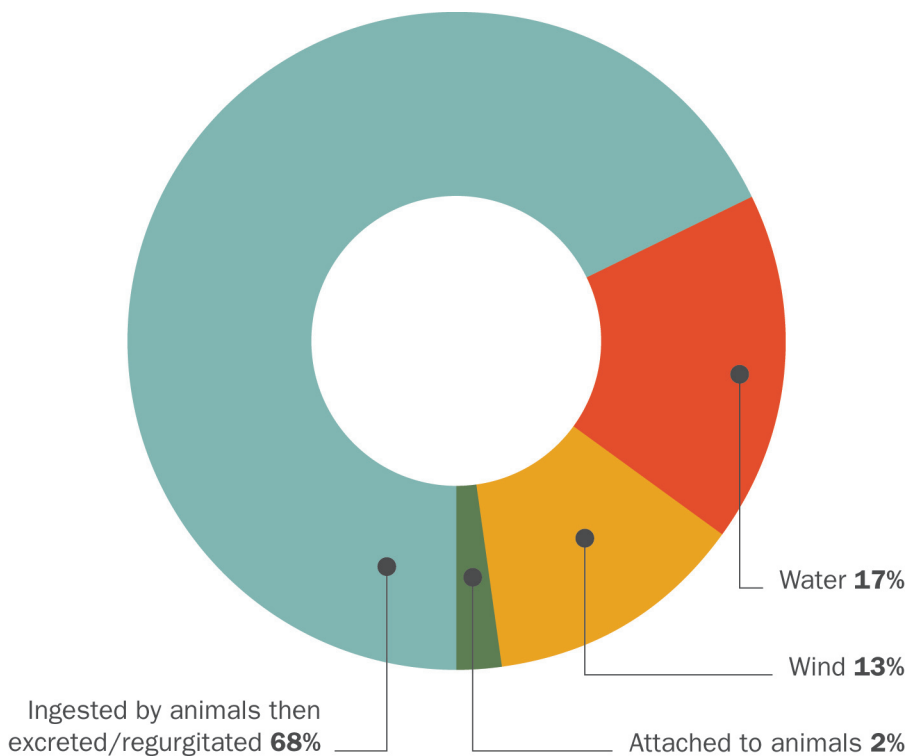
The critically endangered Beach Stone-curlew (*Esacus magnirostris*) has a range extending from Eden in southern NSW, around northern Australia to Exmouth in WA. Only 16 Beach Stone-curlews are known to occur in NSW, and the species is also listed as vulnerable in Queensland. This makes the records for Sand Island of particular conservation importance.

Photo Matthew Jones ©

Fruit of plants such as the weedy Broad-leaved Peppertree (*Schinus terebinthifolia*) (right) have 'escaped' from domestic gardens, and have been transported to the island by animals, thereby degrading wildlife habitat.

Photo Mark V Robinson ©

Sand Island native plants and their dispersal mechanism (below). Most plant species made their way to the island through dispersal by animals, with transport by water being an important secondary route.



FLORA

No planting of any vegetation has occurred on Sand Island, so what is visible today arrived by means of natural dispersal, including water, wind and animals. Remarkably, these plants have formed ecosystems that are habitats for a suite of plants and animals, including some significant species. One hundred and eighteen species of plant have been recorded on the island, 70% (83 species) of which are native with the remainder (38 species) being weeds. About half the weeds on the island have fruit that attracts fruit-eating species. Some of the exotic species have been classified as Weeds of National Significance. Ngurrula Green Team and Nambucca Shire Council are currently managing these weeds, with funding support provided by the Australian Government.

Sand Island Native Plants and their dispersal mechanism

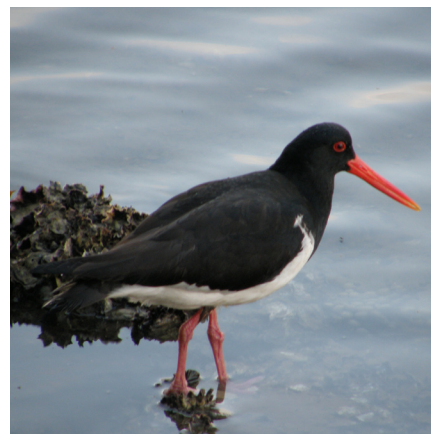
SIGNIFICANT species

The Nambucca River estuary is used by migratory shorebirds along the East Asian-Australasian Flyway. These birds breed in the northern hemisphere summer and escape the harsh northern winters by visiting Australia and New Zealand in the austral spring and summer, returning north in autumn. Several species, including Bar-tailed Godwit (*Limosa lapponica*) and Eastern Curlew (*Numenius madagascariensis*) are regularly observed on the tidal flats around Sand Island. Some migratory shorebirds, generally thought to be first year birds, stay over winter until their departure the following autumn.

A variety of resident shorebirds has been observed, including threatened species like the vulnerable Sooty Oystercatcher (*Haematopus*

fuliginosus), the endangered Pied Oystercatcher (*Haematopus longirostris*), and the critically endangered Beach Stone-curlew (*Esacus magnirostris*). The island is also used by threatened birds-of-prey, including the vulnerable Eastern Osprey (*Pandion cristatus*), which is often observed perching on mangroves or hunting in the adjacent water-body. The vulnerable Square-tailed Kite (*Lophoictinia isura*) can also be observed quartering above the island's forest canopy, hunting for prey.

Sand Island is the southern geographic limit for the Umbrella Cheesetree (*Glochidion sumatranum*) whose distribution, until its discovery on the island, was from the coastal areas of the Clarence River catchment northwards.



The endangered Pied Oystercatcher (Haematopus longirostris) breeds on Sand Island and forages on adjacent tidal flats. Elsewhere in NSW, domestic dogs have killed the chicks of this threatened species.

Photo Mark V Robinson ©

KEY MANAGEMENT ISSUES and ways of addressing them

Disturbance to Fauna

Human recreation activity can disturb wildlife, sometimes to its detriment. Research in the Manning Estuary indicates, for example, that Beach Stone-curlews are readily disturbed during their breeding season, and research from Victoria suggests that some migratory waders are quite sensitive even to passive human activities. Furthermore, there is concern that disturbance to migratory shorebirds before their autumn departure may affect their ability to store 'energy' reserves for their return flight to the northern hemisphere. It would, therefore, be considerate not to go near the island from mid-autumn to the end of winter so as to minimise such disturbances to resident shorebirds that may use the island during the breeding season. Similarly, it would be wise to consider your route in watercraft, and watch for shorebirds, especially in autumn.

Domestic Dogs

Domestic dogs have been known to kill Beach Stone-curlews and Pied Oystercatchers in NSW. Keeping your dog off the island will lower the risk to native wildlife.



Weed Invasions

Weeds of National Significance, and other environmental weeds, are threatening and degrading vegetated habitats on the island. Professional bush regenerators have been at work on the island; however, many of the weeds are garden escapees. Is your garden a source of weeds that invade bushland? Get advice from Council or Landcare if you are unsure what plants in your gardens are bush-unfriendly.

Garbage and fishing debris

Plastics in the ocean are known to kill seabirds, marine mammals and marine reptiles. In 2012 in NSW, a 'valuable' Beach Stone-curlew chick was tangled in discarded fishing line and consequently drowned on the incoming tide. Remember: 'Stow it—don't throw it', and please don't leave your rubbish behind! You can also be helpful by picking up rubbish and discarded fishing line that others have left behind.

Pollution from boats

Keep your motorised boat mechanically well-maintained to prevent fuel leaks polluting water and sediments.



An early (1891) hydrographic survey of lower Nambucca Estuary, pre-Sand Island (above). (See Cavanagh et al., 2006, for details on early interventions in the Estuary.)

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