

3 ECOLOGICAL ASSESSMENT

3.1 Methodology

For the purpose of this assessment, the term *study area* refers to waters and foreshores (to 50 m inland) extending from the drop-over (situated between Marks Point and Coon Island Point) to Swansea Bridge.

Initially, a desktop review of existing vegetation mapping and aerial photography was undertaken to determine the location of seagrass, wetland and foreshore vegetation within Swan Bay and the wider study area. Vegetation polygon boundaries were then digitised from geo-corrected 1:10,000 aerial photographs. The following vegetation alliances were mapped on the basis of colour and textural characteristics, namely:

- terrestrial foreshore vegetation,
- mixed mangrove and Casuarina forest;
- mangroves;
- saltmarsh;
- dense seagrass (>50% cover);
- moderate seagrass (10-50% cover);
- sparse seagrass (<10% cover).

Field investigations were then undertaken to ground-truth the boundaries of vegetation polygons, and determine the dominant species comprising each vegetation polygon. The resulting mapping of vegetation is shown on Figure 3-1.

3.2 Habitat and Ecological Community Description

3.2.1 Foreshore and Estuarine Wetland Habitat

3.2.1.1 Swan Bay Foreshore

The terrestrial foreshore vegetation of Swan Bay was mostly comprised of species that are tolerant of waterlogged soils, which were dominated by two main species: the Swamp she-oak *Casuarina glauca* and the Paperbark *Meleleuca quinquenervia*.

The largest terrestrial remnant identified within Swan Bay occurred immediately north of the Aeropelican Airport runway (Figure 3-1). This remnant was a closed (semi-wetland) forest dominated by *C. glauca*, *M. quinquenervia* and the Cabbage Tree Palm *Livistonia australis*. The Aeropelican Airport runway to the south, and urban development and road infrastructure in the east, have effectively isolated this remnant from other remnants in the wider study area. Prior to European settlement, this remnant was part of a larger stand that extended along the Swansea-Belmont coastline.

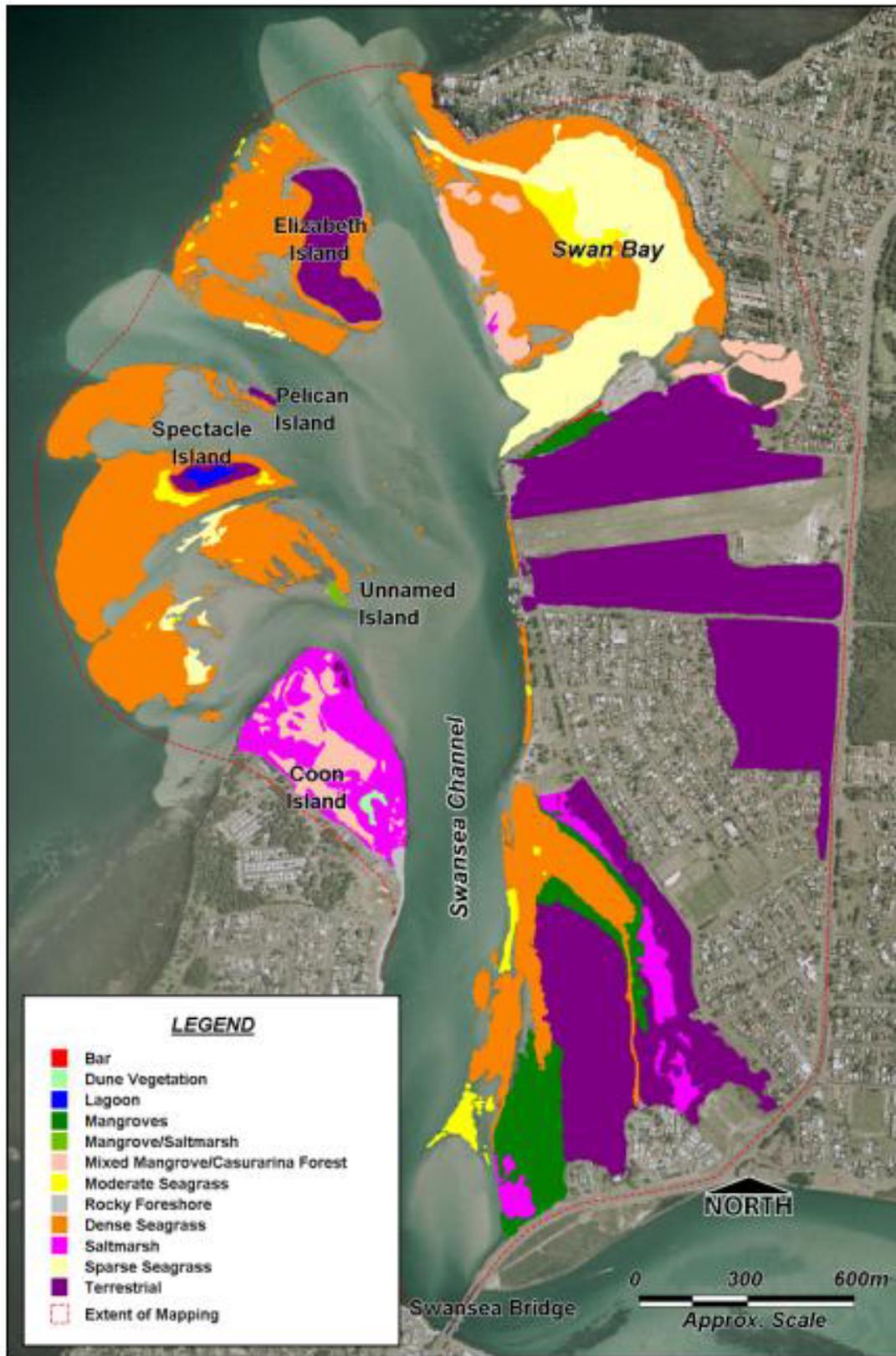


Figure 3-1 Vegetation Mapping (February, 2002)

The south-western foreshore of Swan Bay is receding. The banks of the channel were undercut, and several large *C. glauca* had fallen into the water.

A narrow fringe of Grey mangrove *Avicennia marina* was recorded along the southern shoreline of Swan Bay. This mangal was situated behind a sand bar/spit that ran parallel to the shoreline. A shallow lagoon has formed behind the spit, and water quality within the lagoon appears to be degraded (white surface scum, water cloudy appearance, epiphyte mat on seagrass). Towards the western section of the sand spit, there was evidence of recent sedimentation, as evidenced by the burial of the trunk and pneumatophores of young (<1 m height) mangroves.

Towards the eastern end of the lagoon, mangroves were more mature (3-4 m height) and had higher densities than towards the western end. Terrestrial groundcover (grasses) has also begun to colonise the eastern end of the spit.

Foreshore inspections undertaken in 1988 for the preparation of the Swan Bay dredging EIS also noted that the southern shoreline of Swan Bay was subject to increased sedimentation, and that reeds (*Phragmites*) and mangroves were spreading into shallow water. Notably, no mention of the sand spit was made in the Swan Bay dredging EIS, which supports the argument that the spit is a relatively recent feature.

3.2.1.2 Swansea Channel Foreshore

A large terrestrial vegetation remnant was situated immediately south of the airport, and landward of Pelican Marina. This remnant was separated from the remnant to the north by the Belmont Airport runway. The vegetation communities of this remnant was similar to those at the larger remnant situated to the north of the runway, and comprised a closed forest dominated by *Casuarina glauca*, *Meleleuca quinquenervia* and the Cabbage Tree Palm *Livistonia australis*. The marina and associated infrastructure separates this remnant from Swansea Channel.

Along Pelican Channel there was a well developed estuarine wetland complex comprising:

- a *C. glauca* dominated remnant located on the eastern foreshore of Pelican Inlet;
- a narrow Sea rush *Juncus kraussii* dominated saltmarsh community located adjacent to mangrove community;
- a mangrove-dominated estuarine wetland that fringed both sides of Pelican Inlet and extended east of Swansea Bridge.

The western foreshore of Swansea Channel has been almost entirely cleared of trees. The most notable exception to this were the small patches of mature *C. glauca* located near the northern tip of Coon Island.

3.2.1.3 Coon Island

The vegetation communities of Coon Island comprise a complex mosaic of mangroves, saltmarsh species and *Casuarina glauca*. Saltmarsh communities were numerically dominated by Sea rush *Juncus kraussii* and the sedge *Baumea juncae*, with Seablite *Sacocornia australis* and Salt couch *Sporolobus virginicus* being locally common. Mangroves were restricted to drainage channels,

whereas she-oaks formed a thin fringe around the wetland, and were more common in the northern section of the island. The Coastal morning glory *Ipomoea cairica* was common on the fringe of the wetland adjacent to the caravan park.

The wetland is under considerable human pressures. Like many NSW urban wetlands, dumping is an ongoing problem. During site inspections, two people were observed to illegally dump a trailer-load of garbage into the wetland. Litter, campfires and broken bottles were observed in many places, particularly near the viewing platform on the northern tip of the island. The numerous recreational facilities (boat ramp, picnic tables, BBQ's) make this area a popular spot with visitors; hence human disturbance is also a major pressure on flora and fauna communities.

3.2.1.4 Sand Islands

All sand islands situated at the head of Swansea Channel contain plant communities. Most of these islands were formed by dredged material placement activities within the main navigation channel. All islands are under intensive pressure from human visitors and dogs, diminishing their habitat values.

Species of conservation significance previously recorded in Lake Macquarie (AWACS 1995) that are likely to utilise these sand islands include (but are not limited to) Caspian Tern *Hydroprogne caspia*, Little Tern *Sterna albifrons* and Eastern Curlew *Nomenius madagascariensis*.

These species have been listed as internationally significant either by CAMBA (Agreement between the Government of Australia and the Government of China for the protection of migratory birds in danger of extinction and their environment 1986) and/or JAMBA (Agreement between the Government of Australia and the Government of Japan for the protection of migratory birds in danger of extinction and their environment 1974).

These agreements oblige the Australian government, as a signatory to these agreements, to undertake a range of actions on behalf of the species listed. These include the preservation and enhancement of important habitats, establishment of sanctuaries and other facilities for the protection and management of migratory birds and their habitats, and preventing damage to migratory birds and their habitats.

Elizabeth Island

The largest sand island in the study area is Elizabeth Island. Terrestrial vegetation communities were dominated by Bitou bush *Chrysanthemoides monilifera*, which was notably not recorded in field surveys (during November 1994) of the island for the estuary processes study (AWACS 1995). Co-dominant trees and shrubs included *Casuarina glauca* (to 5-6 m height) and *Acacia longifolia* (2-4 m height), with occasional Coastal Banksia *Banksia integrifolia* most common on the western side of the island. A wide variety of groundcover species were recorded included *Juncus* sp, *Hydrocotyle*, *Phragmites australis*, *Scripus nodosus* and *Gahnia* in low-lying areas, and several species of dune vegetation (*Carex*, *Spinifex* and *Carpobrotus*).

This island is subject to intensive human usage, which limits its terrestrial fauna habitat values. At the time of sampling (February 2002), three boats had pulled up on the island, two of which contained

dogs. There was evidence of intensive human usage (broken bottles, litter etc.), which was consistent with the findings of AWACS (1995).

Pelican Island

Pelican Island is located south of Elizabeth Island. Tree and shrub vegetation were co-dominated by *Casuarina glauca* and *Chrysanthemoides monilifera*. Groundcover was dominated by *Sporobolus virginicus*, Buffalo grass *Buchloe dactyloides*, *Carex* and Pig face *Carpobrotus glaucescens*.

At the time of inspections (February 2002), a boat containing two humans and a dog was present on the island. There was evidence of intensive human usage (broken bottles, litter etc.), which was consistent with the findings of AWACS (1995).

Spectacle Island

Spectacle Island is another relatively large sand island, which was situated immediately south of Pelican Island. The most common terrestrial vegetation species on the island was *Casuarina glauca*. Other common species observed included in the present study, and by AWACS (1995), were Bitou bush, Couch and Buffalo Grass, and Pig face.

This island has a large, shallow salt-water lagoon towards its centre, which is largely unvegetated. A wide variety of estuarine wetland species were recorded on the island. A thin fringe of *Avicennia marina* was recorded around the lagoon, and fringing the island. Sea purslane *Sesuvium portulacastrum*, *Juncus krausii* and *Sporobolus virginicus* were common, particularly in low-lying areas surrounding the lagoon.

Like the other sand islands within the study area, there was evidence of extensive human usage of the island, including litter, camp fires, and broken glass.

Unnamed Islet adjacent to Coon Island

A small, unnamed islet was situated immediately north of Coon Island. Vegetation comprised almost entirely estuarine wetland species including *Avicennia marina*, *Sarcocornia queinueflora*, *Sueuda australis* and *Sporobolus virginicus*.

Recreational anglers were observed gathering bait on the shallow sand banks using a yabby pump.

Spoil Islands in Swan Bay

A chain of small sand islets has formed by the placement of dredge spoil on the western side of Swan Bay. Vegetation on the southern islet was numerically dominated by *Avicennia marina* and to a lesser extent *Casuarina glauca*, with a *Juncus krausii* and *Sporobolus virginicus* groundcover. Erosion along the southern islet has resulted in several *C. glauca* having fallen into the water, and the extensive exposure of mangrove pneumatophores and roots.

The more elevated lands on the northern islets had a larger variety of terrestrial tree and shrub species. The most abundant species were *Chrysanthemoides monilifera* and *C. glauca*, while occasional *Acacia longifolia* and *Banksia integrifolia* were less common. *A. marina* were the dominant trees along the foreshore of the northern islets, while *J. krausii*, Buffalo grass *Buchloe dactyloides* and *S. virginicus* were the most common groundcover species.

3.2.2 Seagrass

Swan Bay

Seagrass beds almost entirely cover the substrate below low tide level, except on the southern side of the bay. Two species are present within the embayment: the Strap-weed *Posidonia australis*, and the Eelgrass *Zostera capricorni*. *Z. capricorni* was mostly restricted to the shallow margins of the embayment. *P. australis* was most common in deeper sections of the bay, most notably near the entrance to Swan Bay between Marks Point and Pelican Point, and within the deeper sections in the north-western part of the bay.

As discussed in Section 3.2.1.1, a spit running parallel to the southern shoreline has formed a shallow lagoon. A small patch of *Z. capricorni* was observed towards the eastern end of the lagoon, and appeared to be in poor health. At the time of site inspections, a dense algae mat covered the seagrass, which in time will result in the death of the seagrass.

The formation of the algal mat is likely to be a result of poor flushing. In this regard, the absence of water movements (wave or current action) would allow the algal mat to develop in relatively undisturbed conditions. The lack of flushing of lagoon waters could also result in the accumulation of nutrients, and the subsequent development of the algal mat.

Swansea Channel

Large seagrass beds were recorded on the shoals along the drop-over. These seagrass beds comprised *Posidonia australis* and *Zostera capricorni*.

Within Swansea Channel, large beds of seagrass (predominantly *Z. capricorni*) were recorded within Pelican Inlet, along the eastern bank of Swansea Channel between Swansea Bridge and the entrance to Pelican Inlet, and within the western parts of the dropover in the vicinity of the sand islands.

These seagrass beds have very high conservation and fisheries values, providing food (directly and indirectly) and shelter for a range of invertebrates and fish, and food resources for birds of conservation significance (seagrass-associated invertebrates, direct utilisation of rhizomes by Black Swans). Seagrass also assist in the stabilisation of shorelines, and are important in the maintenance of nutrient cycles. Seagrasses are protected from disturbance or destruction under the *Fisheries Management Act 1994*.