

NSW Marine Habitat Mapping Project

Sponges

Sponges are “sessile” animals (i.e. they are attached to the seafloor). They are known as filter feeders and pump water through their matrix and filter out particulates of food matter. Sponges are among the simplest of animals and their porous bodies lack any internal organs, a nervous system, or circulatory and digestive systems.

The identification of sponges is usually difficult as it relies on the examination of the distinctive structural elements (spicules) which form the skeleton of most species. Sponges make up the phylum Porifera, which is divided into three classes that are distinguished by the nature of the spicules.

- Demospongiae: contain siliceous (SiO_2) spicules or lack a mineral skeleton.
- Hexactinellid: possess 6-rayed siliceous spicules and are usually restricted to areas on the continental shelf and deeper.
- Calcarea: comprise calcareous (CaCO_3) spicules.

Although the classification and naming of sponge species is incomplete it is currently estimated that Australia possesses a little over 1400 described species, or around 26% of the described world sponge fauna. At least half of the species found in Australian waters are thought to occur no where else. Around 90% of modern sponges are demosponges.



Photo by Dave Harasti

Sponges have a high diversity of growth forms including elongate, branching and erect, encrusting, tubular and vase, although the cover of particular forms is highly variable. The high diversity in growth forms of sponges indicates a high species diversity as the diversity of growth forms can provide a qualitative estimate of species diversity. However, some sponge species have a range of different growth forms and this presents problems when examining broad patterns of diversity.

Where are sponges found?

Modern sponges are found from the intertidal zone to depths of around 6,000 m, and while being predominantly marine, some species are adapted to estuarine and freshwater environments. They are worldwide in their distribution, and range from waters of the polar regions to the tropics. While sponges are found over a wide range most individual species are limited to a narrower range of depths and latitude.

Sponges are an important component of subtidal benthic assemblages in temperate coastal waters of Australia, and are usually the dominant faunal group in terms of cover and diversity in depths exceeding 20-30 m. Their density and distribution is determined by a number of biotic and abiotic factors, including depth and light, roughness and slope of the seabed, amount of wave exposure and the density of key grazers such as sea urchins. For example, while sponges do occur on shallow rocky reefs throughout much of NSW (those <25 m deep), these habitats are dominated by various types of kelp or areas grazed by sea urchins (urchin barrens) and sponges are low in abundance. The exception is on vertical or near vertical surfaces, where a range of sessile invertebrates dominate, with cover often exceeding 95% on tall (>3 m high) walls.

Horizontal surfaces in urchin barrens also support sponge fauna, but they tend to be patchy and cover <2% of the substratum, usually with grazer resistant species dominating. Because of the patchy nature of habitats on shallow reefs in NSW the relative abundance and composition of sponge assemblages change quite dramatically over

short distances depending on the type of rocky reef occupied.

In general, the number of erect and massive sponge species tends to increase with depth below the zone dominated by macroalgae, although the opposite seems to occur with encrusting species. The abundance of sponges tends to be highest under conditions of strong water flow and they tend to do poorly in shallow sheltered embayments which experience limited flushing. NSW estuaries are known to contain some sponge species, with evidence that Wallis Lake has a high diversity.

Seabed habitats in depths greater than around 25 m that are dominated by sponges often contain a range of other sessile invertebrate species including stalked ascidians (sea squirts), octocorals, soft corals, anemones and bryozoans. These are often referred to as 'sponge gardens' and contain a large number of species, many of which are poorly described.

In several places in temperate Australian waters sponges are also commonly found on soft-sediment habitats (e.g. sand, mud). In these areas sponges often develop diverse assemblages on the pebbles and cobbles, shells, tubes or fronds of organisms that have established on the sediments.



Photo: David Harasti

Recent seabed habitat mapping in NSW has identified extensive areas of habitat on the continental shelf that provides suitable habitat for sponges. Based on the presence of sponge assemblages over much of the rocky reefs surveyed with video, it is likely that such assemblages cover a large proportion of the deep reef habitat on the NSW continental shelf. The extensiveness of this habitat type means that sponge gardens may be one of the dominant seabed habitats in NSW.

Why are sponges important?

Sponges play key functional roles in benthic marine ecosystems and have complex interactions with other components of those ecosystems. They can stabilise the substratum by binding components of the reef together, and it is likely that some temperate species are also responsible for eroding reef habitats through boring. Because of their high filtration rates they also play a key role in the cycling of nutrients in the ocean. They also provide habitat for a variety of small and large animals, including other sponges. They are a particularly important habitat for fish and other invertebrates, including annelid worms, nudibranchs, bryozoans, crabs, shrimp, prawns, sea urchins and sea stars. Many species are associated with specific sponges, either due to camouflage or feeding requirements.



Photo: Isabelle Thiebaud

The large amount of reef habitat on the NSW continental shelf indicates that sponges are likely to play important functional roles in these waters. It is also likely that there is a considerable amount of sponges in areas mapped as soft-sediment habitat as sponges have been found to be associated with this habitat in other temperate areas of Australia. This highlights the need to improve our understanding of the distribution, abundance and ecological role of sponges in NSW waters.

