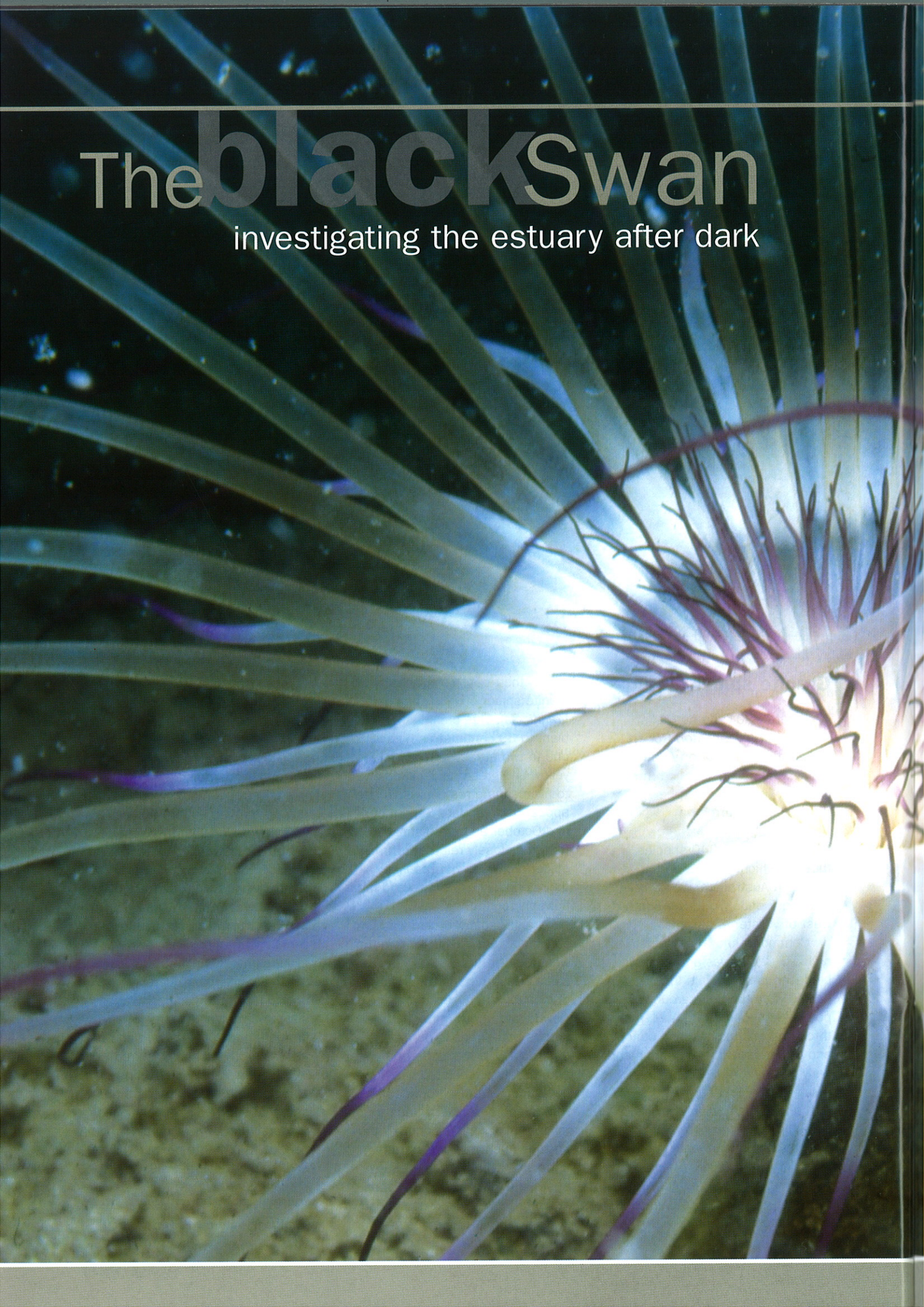


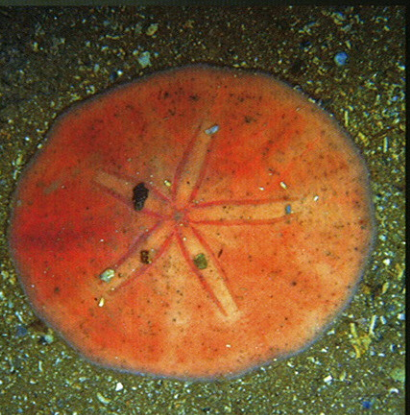
# The blackSwan

investigating the estuary after dark





Come sundown, when many creatures are winding down after the bustle of the day, the cloak of darkness prompts others to get moving. They belong to the night shift, the nocturnal animals that take advantage of the gloom to forage in relative safety. We look at some of those found on Perth's doorstep after dark, in the waters of the Swan estuary.



by John Huisman and Luke Twomey

The Swan estuary is truly the lifeblood of Perth. Although we might not readily acknowledge it, the estuary plays a major role in the lives of most Perth residents. This beautiful waterway provides us with a foreground to vistas of the city and a backdrop to our drives along the freeway. And we use it. We swim in it, fish from it, sail on it, have picnics on its shores and spend many hours just sitting and looking at it. The estuary enhances our lives in many ways and the fact that it is in a reasonably healthy condition is something we should all be grateful for, but not take for granted (see 'Ecosystem health of the lower Swan estuary' on page 50).

While it's a major part of our lives, for the most part we don't look below the surface. The Swan's beauty is more than skin deep and the only way to view some of its unique attractions is by diving. Western Australia has some of the most spectacular diving locations in the world, from the rugged, high-energy coasts of the south, to the limestone reefs of Rottnest Island Marine Reserve and the spectacular corals of Ningaloo Marine Park. Perhaps understandably, given the extent of



such marine riches, investigating the Swan is rather low on most divers' list. But, given the right circumstances, the estuary can be very rewarding. The best way to view its beauty is at night. It's dark and most often cold, and given a choice most people would prefer to be curled up with a good book. But it's an entry into an alien world that exists right on our doorstep.

### Night stalking

Night diving is an activity that requires specialist training, more so than for daytime scuba diving. Although not inherently more dangerous, it's easy to become disoriented without the sun's rays to guide you, and an underwater torch is essential. Several things happen on a night dive. The beam of the torchlight narrows your focus, so you are not distracted by what is going on around you and can concentrate. It's

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**Main** The purple-tipped tube anemone (*Pachycerianthus* sp.), one of the estuary's more spectacular inhabitants.

Photo – John and Val Butler/Lochman Transparencies

**Inset** Lesueur's sand dollar (*Peronella lesueuri*) feeds along the estuary floor.

Photo – John Huisman

**Below** Swan River near Coombe Reserve.  
Photo – Rob Oliver

surprising what leaps out—the busy reef suddenly yields a beautiful seahorse, or a crab scurries along the soft estuary floor. And prawns. Yes, it must be stated that many night divers have a singular objective, to collect a feed of delicious western king prawns (*Penaeus latisulcatus*). When disturbed, the prawns do their best to nestle into the soft sediments of the estuary floor. But this is often to little avail as their eyes shine like beacons under the torchlight and the diver has little trouble locating them.

Western Australian seahorses (*Hippocampus subelongatus*), which as their name indicates are found only in WA, are common in the estuary's lower reaches and are easily observed at close view. They tend to congregate





**Above** A warty sea cucumber (*Cercodemas anceps*) catches drifting food particles.



**Above right** A female Western Australian seahorse (*Hippocampus subelongatus*).



**Right** A western king prawn (*Penaeus latisulcatus*) hides in the soft sediment. Photos – John Huisman

around solid structures, as they require something to attach to. Although they are timid, as long as you observe them without touching, most seahorses will stay put, providing excellent views of their incredibly detailed patterns. The colours of Western Australian seahorses vary from white to brown, orange, yellow or pink, but they always have a distinguishing series of brown lines on their snout. Seahorses have an unusual method of brooding their young. The female lays her eggs in a pouch on the male's belly, which the male then fertilises and incubates until they hatch as miniature seahorses. Males tend to be darker in colour and have the obvious pouch, whereas females are often pale.

One very surprising change when darkness falls is the appearance of large numbers of blue manna crabs (*Portunus pelagicus*). At sunset the crabs emerge to feed, either scavenging detritus or eating small crustaceans and other invertebrates. Only the male is the vibrant blue colour; the female is a drab brown. Large numbers of crabs are fished from the Swan estuary each year. From a recent survey it was estimated that the total annual recreational catch of blue manna crabs from the Swan-Canning Estuary Basin was 20,875 crabs or 7.3 tonnes.

### Spineless wonders

The purple-tipped tube anemone (*Pachygerianthus* sp.) is truly spectacular.

Its mixture of vivid purple and white tentacles waves in the water, trapping all manner of small food. These anemones stand proud in the muddy sediments of the deeper parts of the estuary, their tentacles spreading to about 30 centimetres. While the tentacles of this anemone do not sting, be very wary of a second, less common species, the armed anemone (*Dofleina armata*), which can cause a very painful sting.

An animal with similar feeding habits is the warty sea cucumber (*Cercodemas anceps*). If you watch closely, you can see this animal use its arms to catch small morsels of food that drift by in the water, then insert its arms into the central mouth to suck off the food. The warty sea cucumber, however, is not related to anemones. It is actually a holothurian, a close relative of the sea cucumbers that are collected as 'trepan' in many tropical areas. These are a culinary delicacy in parts of Asia.

Like the sea cucumbers, Lesueur's sand dollar (*Peronella lesueurii*) is related to sea stars and sea urchins. Looking

very much like flattened urchins, sand dollars move about on very short spines, typically buried under a layer of sand or pieces of broken shell. They are very slow moving and feed on organic particles in the soft sediments. If you gently brush away the sand, the attractive star pattern on the sand dollar will be revealed. Closely related is a pale orange sea star (*Stellaster* sp.), which also emerges to feed. Sea stars use small tubular feet on their underside to move about. One such sea star was photographed feeding on the remains of a blue manna crab. Nothing is wasted.

Cuttlefish (*Sepia* sp.) are related to squid and octopuses, both of which also inhabit the Swan estuary. They are able

## Ecosystem health of the lower Swan estuary

The lower Swan estuary is a highly modified system that has been significantly changed since European settlement. Perhaps the largest single impact was the development of Fremantle Harbour in 1896, as the river mouth was widened and deepened to allow access to shipping. These alterations greatly affected the estuary and transformed it from an environment with moderately salty water to a system dominated by salty marine waters.

A more incremental impact has been the population growth of Perth, which has now exceeded 1.5 million. The vast majority of Perth's residents live within the Swan catchment and their activities have directly impacted on the river system, including increased nutrient and sediment loading and contamination by chemical pollutants such as petrochemicals, pesticides and heavy metals.

The Swan River Trust, established in 1989, protects and enhances the ecological health and long-term community benefit of the Swan and Canning rivers and associated land. A major focus of the trust is to reduce algal blooms associated with excessive loads of nutrients (eutrophication) and promote healthy functioning of the ecosystem. The trust is working with the community, stakeholders and other government departments to reduce environmental degradation and improve the management of the river system.

Since 1994, water quality in the Swan River system has been monitored weekly. In general, the water quality is good with no indications of decline in the past 20 years. Hearteningly, the levels of nitrogen and phosphorus, major components of the fertilisers that many Perth residents apply liberally to their gardens but which also fuel algal blooms when they enter the river system, have continued to decrease in the lower estuary during the past decade.

The lower Swan estuary supports a highly productive food chain involving communities of plankton, invertebrates and fish that are the most diverse of the system. These animals are largely marine and include recreationally fished species such as black bream, Australian herring, tailor and whiting.

However, there are several problems associated with the river. In some locations, heavy metals have been detected at concentrations above levels regarded as acceptable by Australian guidelines. This is largely due to industrial practices, disused landfill facilities and boat maintenance facilities. In some of these areas there has been a direct influence on organisms, such as black mussels, that are susceptible to this kind of contamination. According to the Department of Health, people should never eat wild mussels from the Swan and Canning rivers, as numerous human health risks associated with eating them have been identified.

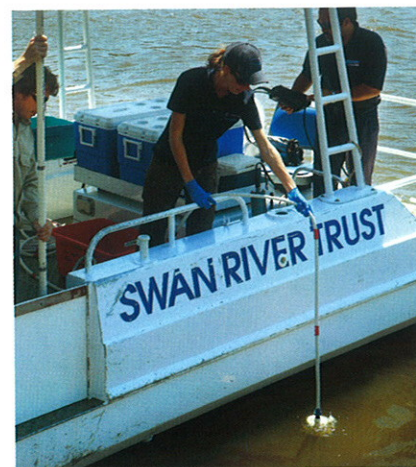
to rapidly change colour to match their surroundings. This instant camouflage gives them a distinct advantage when avoiding predators, or conversely when hunting prey. Cuttlefish move by gently undulating the fins along their sides, but if they need to move in a hurry they can propel themselves by expelling water at a rapid rate.

### Fishy practices

The bottom-dwelling smalltooth flounder (*Pseudorhombus jenynsii*) is almost perfectly camouflaged against the mottled estuary floor. It is an ambush predator, waiting patiently until a suitable prey comes along, which it will then pounce on. Flounder are able to change their colour and even their pattern to match their surroundings,

making them very difficult to spot. The flounder's body is unusually modified to suit its lifestyle, with both eyes having migrated to the upper side of the body. This allows the fish to lie flat on the estuary floor, almost perfectly camouflaged. Almost as well camouflaged is the finger dragonet (*Dactylopus dactylopus*), which props itself on the detached 'finger' at the start of its ventral fin and appears to 'walk' along the bottom.

Nestled among the seaweed on the estuary floor you often see wavy grubfish (*Paraperis haackei*). These fish are part of the sandperch family and can be recognised by their white-to-brown body, which has a stripe along the upper side. Wavy grubfish are found only in Australia, from eastern South



**Above** Water sampling, a key part of the monitoring of the estuary's health.  
*Photo – Swan River Trust*

**Background left** The armed anemone (*Dofleina armata*) is spectacular to look at but can deliver a painful sting.  
*Photo – John Huisman*

Australia to the central coast of WA. They are usually active during the day, feeding on small invertebrates and fish. Come nightfall, the fish change to their nocturnal colours. Adopting a blotchy, disruptive colour pattern makes them harder to see, and therefore less vulnerable to predators.

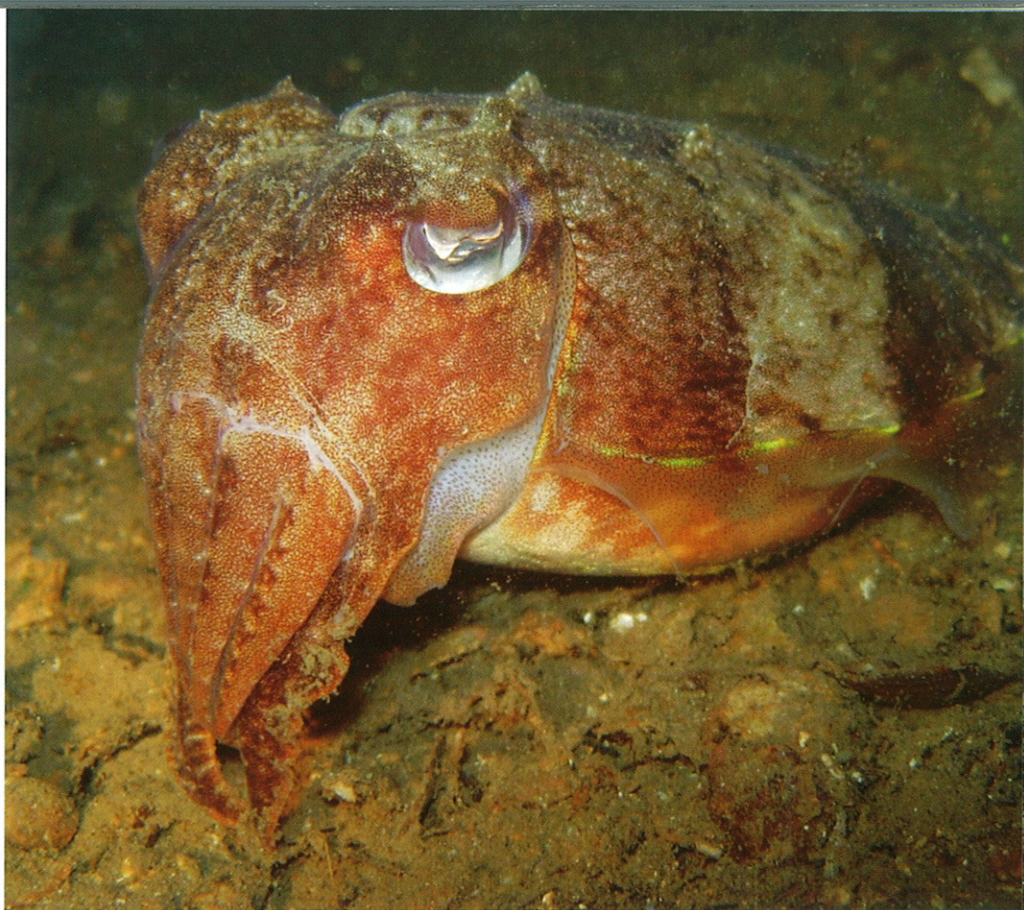
Common blowfish (*Torquigener pleurogramma*) are regarded as a bit of a curse by estuary fishers, as they often take the bait intended for more desirable species. A recent survey found blowfish were the most commonly caught fish in the Swan estuary. Many of these were left to die—a cruel and pointless exercise as there is no way that numbers could possibly be reduced by this practice. These fish are poisonous, so leaving them lying on the shore also places curious children and pets at risk. Blowfish fill an important role in the estuary, as they are helpful scavengers, cleaning up anything edible. Being toxic, they have little to fear from predators. They feed on a wide variety of prey. The small fish take mainly polychaete worms and small crustaceans, whereas larger adults feed mostly on bivalve molluscs. Blowfish tend to congregate in the shallows and sometimes reach densities of five fish per square metre and even more at night. They are an extremely common sight during night dives, particularly near the shoreline.

**Right** A cuttlefish (*Sepia* sp.) displays one of its many colour patterns.

**Below right** A smalltooth flounder (*Pseudorhombus jenynsii*) almost perfectly camouflaged on the estuary floor.  
Photos – John Huisman

The toxin in blowfish, known as tetrodotoxin, is one of the most potent recognised, more than 10,000 times more toxic than cyanide. The same toxin is found in the blue-ringed octopus (another estuary occupant) but is not, in fact, produced by either the blowfish or the octopus, but by bacteria within them. Fish reared in the laboratory are not toxic until they eat something containing the bacteria, which they then accommodate. A single mutation has given the fish and octopus (among others) immunity to the toxin, which they are then free to use for their own protection. In its refined state, a lethal dose of tetrodotoxin is less than a milligram and could be delivered on the head of a pin. Death is by respiratory arrest and there is no known antidote. Blowfish are related to the species used in the Japanese delicacy known as 'fugu'. To prepare fugu, specially trained chefs remove the poisonous parts of the fish (mostly the organs, the ovaries and liver) before serving. Deaths from correctly prepared fish are rare, but many people die from eating inadequately prepared fugu, mostly fishermen without the specialist training. Eating fugu is not something that most Western Australians would consider, but in 2007 a Chinese doctor on board an iron-ore ship in Dampier caught and ate an unidentified species of blowfish. The doctor suffered paralysis and his breathing became laboured. Despite receiving CPR and being evacuated to hospital, he died the next morning. The toxin is so potent that one of the people administering CPR also fell ill after coming into contact with the doctor's vomit, despite not having eaten any fish.

Colourful anemones, innocuous seahorses and voracious and potentially lethal blowfish are just some of the Swan estuary's inhabitants. All of these and more can be seen only a short distance from Perth city. All you need to do is look.

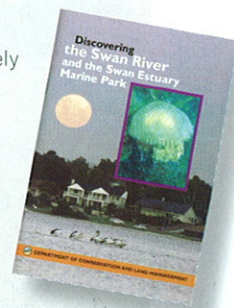


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For more information, see DEC's pocket-sized field guide, *Discovering the Swan River and the Swan Estuary Marine Park*. It is available for \$6.50 from bookshops and tourist outlets, by phoning WA Naturally Publications on (08) 9334 0437 or by ordering online at [www.naturebase.net](http://www.naturebase.net).

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