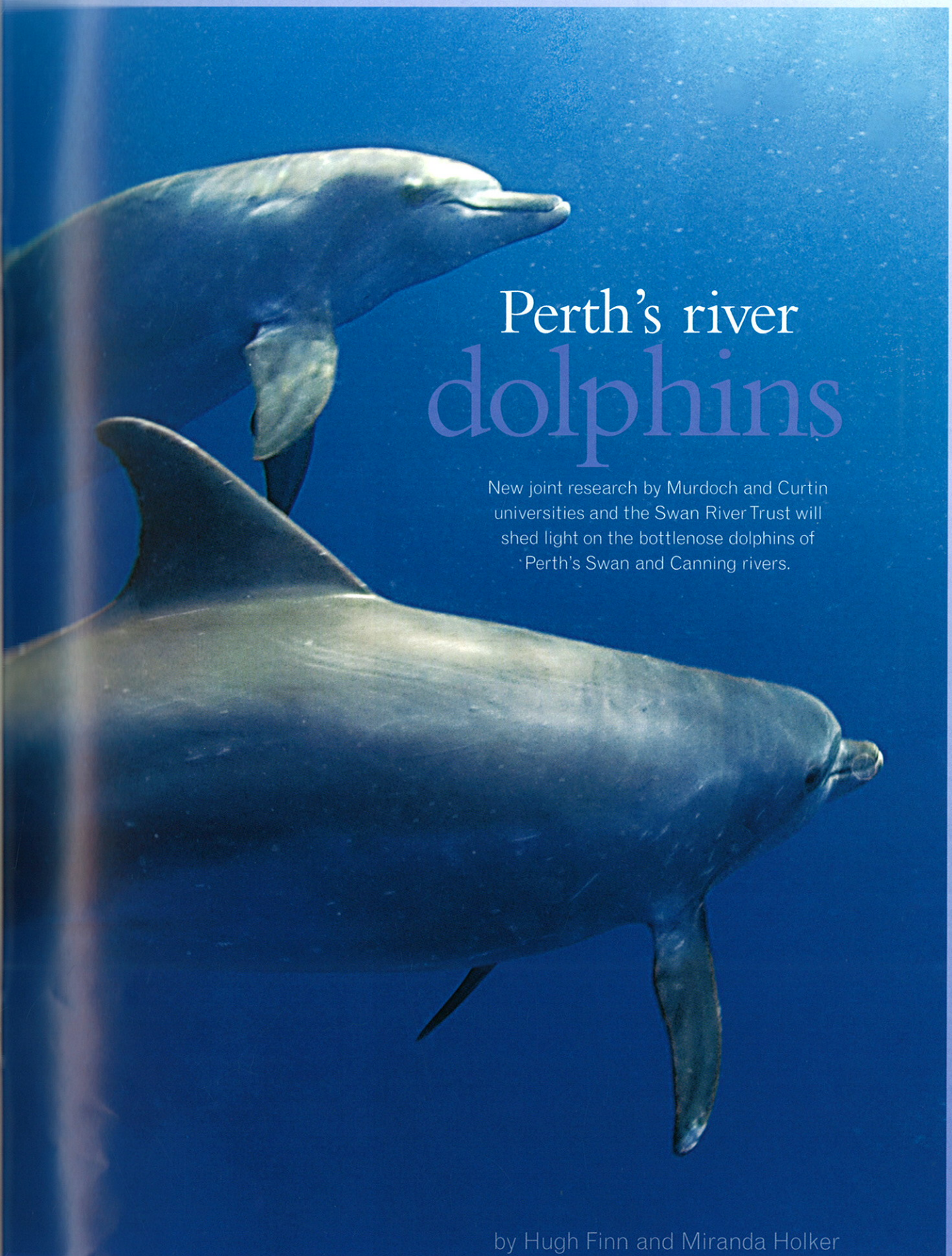


Perth's river dolphins

New joint research by Murdoch and Curtin universities and the Swan River Trust will shed light on the bottlenose dolphins of Perth's Swan and Canning rivers.

by Hugh Finn and Miranda Holker

Bottlenose dolphins (*Tursiops* sp.) are among the most iconic marine species in Western Australia. Occurring along the entire coastline in ecosystems ranging from estuaries to the open ocean, their distribution reflects their ability to adapt to a range of environmental conditions, including the handful of estuaries and bays that occur along the south-western coast of the State.

Few estuarine inhabitants better epitomise the beautiful yet fragile status of the Swan and Canning rivers than the bottlenose dolphins that range along their reaches, which stretch from the Darling Ranges, through the heart of the city before spilling into the ocean at Fremantle.

In many ways dolphins are like a living representation of the river's journey across the Swan Coastal Plain. They move like the river themselves, always in motion, generally running with the tide but content at times to move against the natural flow. They can be seen almost anywhere along the estuary, from the upper reaches beyond Caversham to the mouth of the river. They sit on top of the estuarine food chain, large predators that will consume almost anything the rivers provide.

But the rivers and the dolphins occur alongside a city of more than 1.4 million people. How are Perth's 'river dolphins' faring and how are their lives shaped by living in an estuarine ecosystem that has been—and will be continue to be—profoundly influenced by the city surrounding it?

These questions are the focus of a new research partnership involving researchers from Murdoch University and Curtin University, river managers from the Swan River Trust, and community members from along the river.

A river in trouble

The Swan Canning estuary draws together two river systems—the Swan and the Canning. This is also the name given to one of WA's newest and most unique protected areas—the Swan Canning Riverpark. Officially named in 2006, the riverpark protects part of the Swan and Canning rivers and adjacent public land. The Swan Estuary Marine Park also protects important parts of the Swan River. Both are based on the idea that the estuary should be managed so that future generations can derive the same enjoyment from the rivers as we do today.

But the rivers' future is not assured. While it is often said that the estuary is in trouble, what this means for life in the rivers is often not well understood. Dolphins are one way to tell the story of what this means.

Similar to dolphins in other estuaries and coastal bays, the dolphins inhabiting the Swan Canning estuary form a small 'community' of individuals that are resident year-round and range across a relatively limited area. This makes members of the community vulnerable to the diverse human pressures affecting the estuary.

Understanding pressures

There are two ways to understand the pressures and how they impact on dolphins. The first are the more obvious ones—disturbance from boat traffic, high levels of anthropogenic noise,

Previous page
Main Bottlenose dolphins.
Photo – Shannon Conway/Sallyanne Cousans Photography

Above left Bottlenose dolphin in the Swan River.
Photo – John Goldsmith

Left Perth's river dolphins live side by side with humans.
Photo – Hugh Finn

Above Swan River.
Photo – Len Stewart/Lochman Transparencies

Above right Skimming algae from the surface of the Swan River.
Photo – Dennis Sarson/Lochman Transparencies

Right Canning River Regional Park.
Photo – Brett Dennis/Lochman Transparencies

harassment from over-eager onlookers and entanglement in discarded fishing line. Entanglement is perhaps the single greatest threat to dolphins in the Perth metropolitan area. Researchers from Murdoch University, for example, documented seven instances of entanglement in Cockburn Sound from 1996 to 2003, including five calves. Although adults may survive entanglements, calves often do not and, if they do, often suffer serious injury.

The second set of pressures are more difficult to see, but are no less important in their influence on the lives of dolphins and, in particular, their health and the ecosystem around them. The symptoms of these processes are actually visible and obvious at times—for example, algal blooms and fish deaths—but the causes underlying them invoke questions of chemistry and are therefore more obscure.

The real problem is the nutrients such as nitrogen and phosphorus that enter the estuary from drains, streams and other inputs. The trouble with these nutrients is that, during a summer environment of low river flows, still waters, abundant light and high temperatures, they provide a virtually unending supply of sustenance for the microscopic algae known as phytoplankton.

When phytoplankton grow to excessive abundance and begin to die and degrade, the degradation process uses up all or almost all of the oxygen in the water, leaving large areas absent of oxygen, particularly near the riverbed. Animals living in deoxygenated areas either suffocate in place or move away. In addition, sometimes the phytoplankton themselves are toxic, leading to the phenomenon of harmful algal blooms and associated fish deaths, closures of areas to humans, and nuisance masses of algal scum.

While there is uncertainty about whether algal blooms in the estuary could adversely affect dolphins, evidence from estuaries in other areas of the world indicates that toxic forms of phytoplankton do have a harmful effect on dolphins. And frequent algal blooms inevitably compromise the integrity of an ecosystem, making it less productive, less diverse and less able to sustain dolphins. The populated nature of the Swan Canning catchment means the dolphins may also be exposed to other potentially harmful substances and organisms, which in turn could make them more susceptible to disease.

Dolphins in research spotlight

The deaths of three dolphins in the estuary in the first half of 2009 (one in April and two in June) emphasise the need for careful management of the estuary and its resident dolphins. With the support of the Swan River Trust, work began on an integrated research and community monitoring project that will improve both the scientific basis for dolphin conservation and community engagement in river management. The Swan River Trust, the dedicated Government management agency for the Swan Canning Riverpark, oversees a large and diverse environmental management program, involving water quality monitoring, applied research, and community education and training.

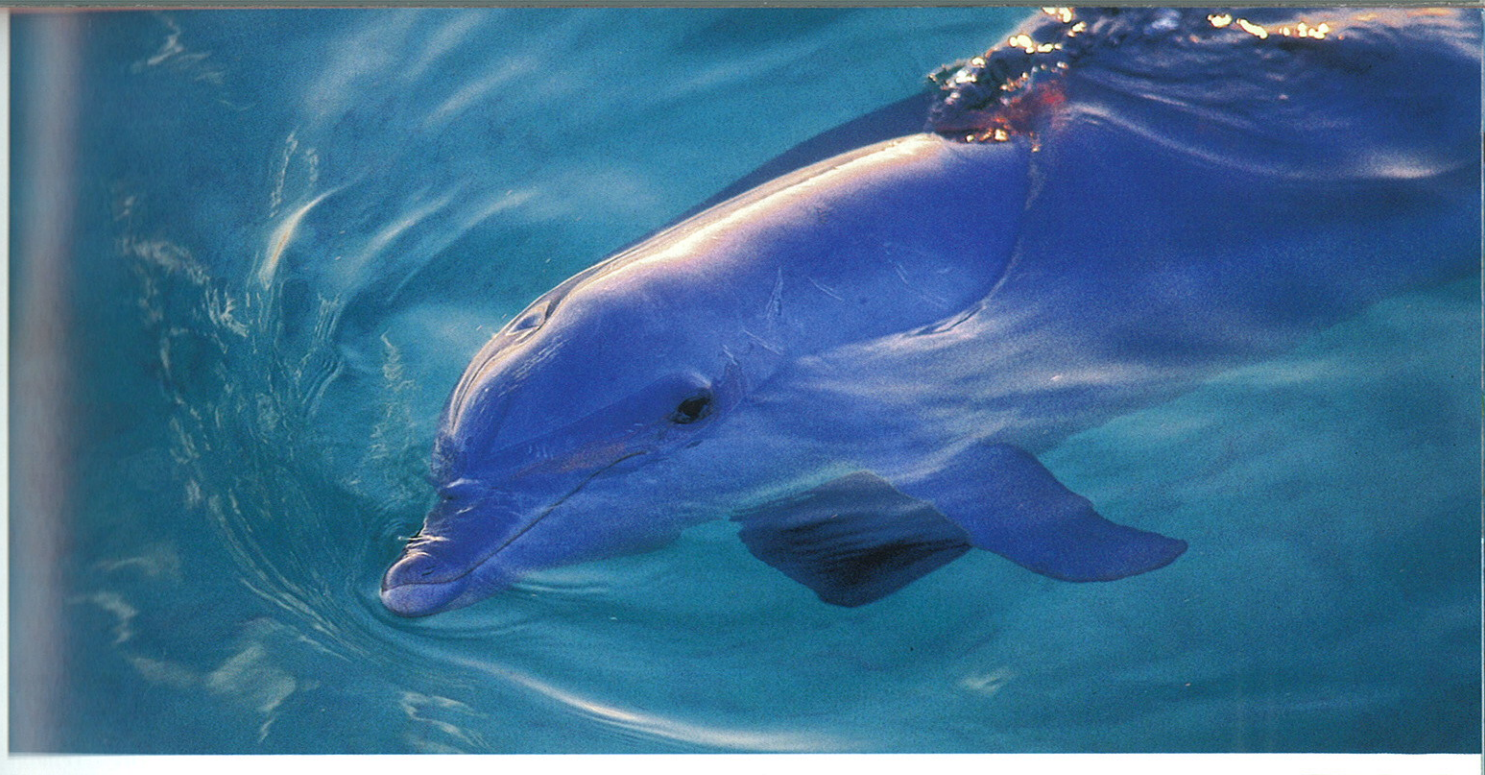
Funding from the Swan River Trust's Swan Canning Research and Innovation Program (SCRIP) is supporting a multi-faceted Murdoch University study. The study is using a biopsy dart system to collect small skin and blubber samples for laboratory analyses. The tissue samples will be tested for the presence of contaminants, including heavy metals and pesticides. The samples will also be integrated into two other ongoing studies, one using stable isotope analysis to examine the structure of the Swan River food chain and the other investigating the population genetics of bottlenose dolphins in south-western WA.

Murdoch and Curtin university researchers are also examining photographs of river dolphins to evaluate the incidence of skin lesions. While there are many possible causes for these lesions and their presence is not necessarily a concern, evidence from other study areas suggest anthropogenic factors such as pollution can contribute to their occurrence. Thus lesions may provide a useful indicator of the health of the dolphin community and, indirectly, the estuary system around them. Similar studies in Cockburn Sound and Bunbury will provide a comparative dataset for the Swan River.

Finally, researchers at the Murdoch University School of Veterinary Medicine are conducting autopsies of deceased dolphins along the south-west of WA to learn more about dolphins and the factors causing disease and mortality. Although disease has recently gained recognition as an important influence in terrestrial wildlife populations, our understanding of disease in dolphins is very limited. Of particular interest is how environmental factors influence the

Above left Bottlenose dolphin
Photo – Eva Boogaard/Lochman Transparencies

Left Toxic blue-green algae.
Photo – Dennis Sarson/Lochman Transparencies



Above Bottlenose dolphin.
Photo – John Kleczkowski/Lochman Transparencies

Right Bottlenose dolphin.
Photo – Rachel Hutton/Swan River Trust

Far right Monitoring river dolphins.
Photo – Miranda Holker/Swan River Trust

incidence of disease. Estuaries present a number of ecological challenges for organisms. They are extremely dynamic, with salinity and temperature changing seasonally and sometimes with each tidal cycle. For dolphins, one challenge of living in an estuary may be greater exposure to potentially harmful pathogens such as viruses, fungi and bacteria.

Perth's river dolphins

The SCRIP project is not the first to focus on the dolphins of the Swan River. During the course of his PhD research with dolphins in Cockburn Sound, Murdoch University researcher Hugh Finn studied the Swan River population from 2001 to 2003. Findings from his work form the basis for our understanding of dolphin ecology in the Swan Canning Riverpark.

Hugh photographed the distinctive dorsal fin markings to identify individual dolphins in the Swan River. Data was also collected on group size, behaviour, and habitat. Studying known dolphins provided information on how dolphins select habitats and move through the rivers.

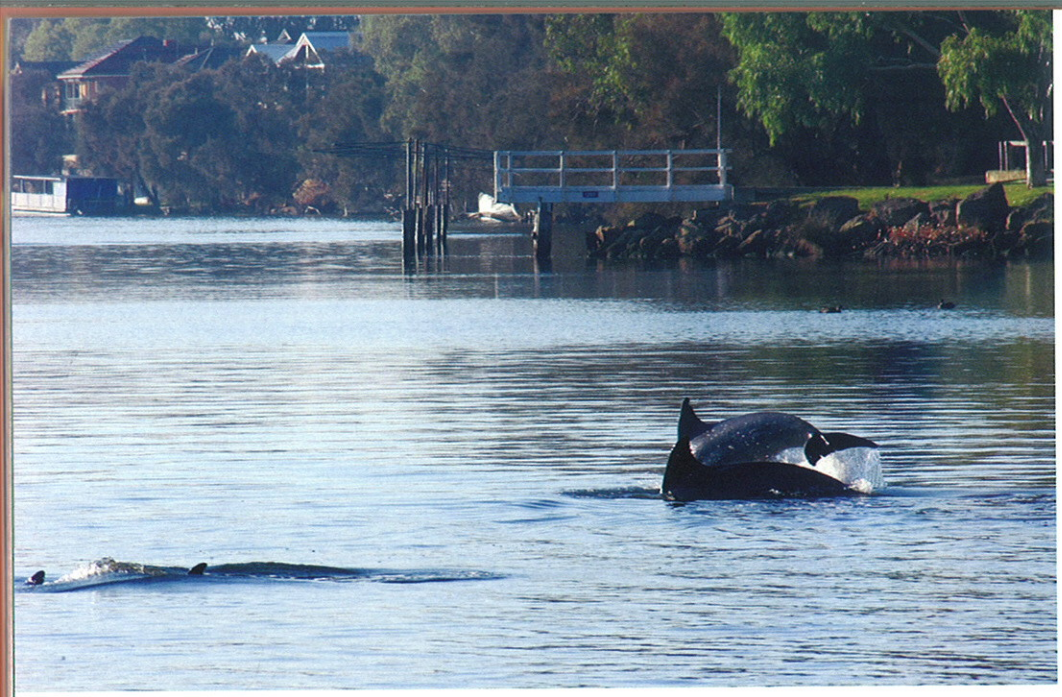
Although more than 40 dolphins were observed, a group of 18 dolphins accounted for the vast majority of sightings and likely constitutes the resident community for the Swan River. Members of this resident community use the estuary on a daily or near-daily basis, often travelling from Fremantle up river to forage for fish along the edges of the lower reaches, around moorings and boat pens, and in the deeper basins in the middle reaches of the river. This community includes several adult females with dependent calves, one or two 'alliances' of tightly bonded adult males, and a large group of sociable youngsters.

It is possible most, if not all, of the resident community were raised in the Swan River, as local knowledge of seasonal conditions, tidal movements and prey patterns is likely to underpin dolphin ecology in the estuary. Researchers hope to answer this question by comparing the relatedness of the Swan and Canning rivers' resident dolphins with those of other dolphins in the Perth metropolitan area, once a larger south-western WA genetics project is complete.

An estuarine ecology

Life for the river dolphins—particularly females with calves—centres mostly on finding food and their time in the estuary is largely spent foraging for fish. A dolphin's diet is broad and may include finfish such as mullet, whiting, bream and herring, and cephalopods such as octopus.

Dolphins considered as Swan River residents actually spend about half their lives in the ocean outside of the estuary, and their movement patterns into and



Above Perth's river dolphins live close to riverside homes.
Photo – John Goldsmith

Above right The River Guardians Dolphin Watch project enlists the community in monitoring river dolphins.
Photo – Miranda Holker/Swan River Trust

Below right Dolphins forage around Port Fremantle.
Photo – Hugh Finn

around the estuary are probably linked to tidal patterns. As these dolphins are really 'part-time' estuary residents, they are also likely to feed in marine habitats such as Owen Anchorage and the seagrass meadows on Parmelia and Success banks between Cockburn Sound and Fremantle. The stable isotope research may shed light on the extent to which the river dolphins are associated with marine and estuarine food chains.

In the estuary, dolphins tend to spend most of their time in the lower to middle reaches of the Swan River and, in the Canning River, following tidal movement upstream before turning back towards the river mouth when the tide turns. However, some dolphins at least occasionally range into the upper reaches of the Swan River, sometimes as far as Caversham—more than 40 kilometres from the river mouth.

The ecology of the river dolphins also reflects the diversity of habitats available to them in the estuary. The river edges and man-made structures such as moorings, boat pens and the Fremantle Port are important foraging areas, while deeper parts of the river like the Melville waters are used for resting. The northern end of the Fremantle Port is particularly important, with dolphins foraging around ships and tugs and stopping to rest and socialise on their way back down the river. The Swan River is, in many ways, a very human river and the human presence provides both problems and opportunities.

Community

For the first time, members of the Perth community can get involved with the river dolphins by taking part in the Swan River Trust's River Guardians *Dolphin Watch* monitoring project. While previous research focused on the lower and middle reaches of the Swan River, *Dolphin Watch* is gathering information about dolphins in the Canning River and the upper reaches of the Swan River. These areas are also the parts of the estuary most affected by algal blooms and deoxygenation, adding to the value of studying dolphins in these areas.

Dolphin Watch is open to members of River Guardians, the Swan River Trust's community engagement program which connects interested people with the Swan and Canning rivers. Training is provided before volunteers take to the rivers, where they record the time, date, and location of dolphin sightings, the number of dolphins sighted, whether a calf was present, which way the dolphins were travelling, and any noticeable behaviour.

Volunteers are trained in basic observation techniques and how to 'observe but not disturb', in keeping with regulations in the *Wildlife Conservation Act 1950* and Department of Environment and Conservation protocols for marine mammal interaction. This includes staying more than 100 metres away from dolphins and taking measures to avoid disturbing animals, such as turning boat motors off. Shore-based observations are ideal as volunteers can observe animals closely without the dolphins knowing they are present.

As well as tapping into the wealth of knowledge in the community, the project will also increase the knowledge and awareness members have of issues affecting the Swan and Canning rivers. *Dolphin Watch* volunteers are making a valuable contribution to scientific research, while gaining skills and networking with others involved in caring for the rivers.

It is free to become a River Guardian. To find out more visit www.riverguardians.com or call the Swan River Trust on (08) 9278 0900.

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