Dolphin Watch
Annual Report
2013 - 14

Preface

Dolphin Watch continues to grow in strength and five years on it has established itself as one of Western Australia's premier citizen science projects. Today it boasts more than 700 registered volunteers who have logged more than 10,000 reports, making a significant contribution to unlocking the mysteries of our Swan Canning Riverpark dolphins.

The vital data collected by *Dolphin Watch* volunteers this year has been interpreted and this annual report serves as a window into lives of the 40 dolphins which include 10 mother and calf pairs living in and visiting the Swan and Canning rivers. To all of the dedicated Dolphin Watchers, please keep up the good work and I thank you, along with agency staff and our research partners, for ensuring that *Dolphin Watch* remains a leading collaborative science project.

Albert Jacob MLA
MINISTER FOR ENVIRONMENT; HERITAGE

Contents

Image by S. Allen   Front cover image by B. Nichols

Foreword

This year marks the fifth year of the *Dolphin Watch* project. It has been a year of innovation and growth as we continue to connect with other dolphin monitoring projects around the country.

We are so privileged that Professor Lyn Beazley AO FTSE has accepted our offer to become the Patron of the *Dolphin Watch* project. Lyn has been an advocate for the project and has helped to mentor the *Dolphin Watch* team and volunteers.

Curtin University research scientist Sarah Marley joined the *Dolphin Watch* training team this year and presented on dolphin ecology in the Swan Canning Riverpark and entertained the audience with her comedic style. We look forward to Murdoch University research scientist Delphine Chabanne's training later in 2014.

The launch of the new *Dolphin Watch* smartphone application has been a real leap forward. I'd like to thank the staff at Gaia Resources and Murdoch University for the development of this App and the volunteers who helped to test and refine the App. Your input has been invaluable.

The Swan River Trust has been busy planning for the long term future of *Dolphin Watch*. This includes trademarking the *Dolphin Watch* brand and working with stakeholders, including Murdoch and Curtin universities, to develop a range of project resources and strategic plans, including implementing a plan for corporate sponsorship. *Dolphin Watch* has attracted some interest from potential corporate sponsors and the plan is to engage a sponsor for an initial three years. The team have also produced some informative and

attractive materials, such as the About *Dolphin Watch* brochure and web pages which help tell the story of *Dolphin Watch*.

Image by S. Harper

It has been great to make connections with other projects involving dolphin monitoring. We met with Department of Parks and Wildlife staff at Monkey Mia this year. The team do an amazing job of educating visitors and locals about dolphins within an interaction zone where people can meet the animals up close and personal. It is a truly magical experience and our teams have started to work together and share resources. We look forward to continuing and developing that relationship into the future.

Kangaroo Island Dolphin Watch is a community and school dolphin monitoring project working in partnership with the Whale and Dolphin Conservation Society. The group has recently celebrated eight years of the program and they are an excellent example of a long-term citizen science program making a difference to our understanding of dolphins. We look forward to developing our relationship with this amazing group in the future.

We now have more than 700 trained volunteers and I would like to thank each and every one of you for your involvement in the project. More eyes on the river mean we learn more about dolphins and how to look after them and their home. Volunteers are invaluable to our ever growing *Dolphin Watch* team. Without you, we could not hope to have such a broad monitoring program. You are providing valuable information and forging new and exciting discoveries about the iconic Indo-Pacific bottlenose dolphins that call the rivers home.

Special thanks to Jennie Hunt and Robert Broadway who have been tirelessly working to collect volunteer data, problem solve and redesign data collection methods as we synchronised our new systems. It was a huge task and we got there in the end. Thanks to Trudy Klessens and Jennie Hunt for their assistance in promoting the project this year.

Marnie Giroud
River Guardians Program Manager
Swan River Trust

Message from our Patron Professor Lyn Beazley

As Patron of *Dolphin Watch*, a role that I feel very honoured to hold, I continue to be amazed by the achievements of the project. We are embracing new technologies so that reports can be submitted online and via a *Dolphin Watch* App created earlier this year.

In another first, an initiative particularly close to my heart was launched at Dolphin Watch Day - this is *Junior Dolphin Watch*. Interested teachers are specially trained by the *Dolphin Watch* team with lessons and support being available to any interested schools in the Swan Canning Catchment. The program is off to a flying start, already attracting more than 500 students across 11 schools. Kit boxes of various teacher resources on dolphins are also available to borrow free of charge from the Swan River Trust's Education Officer. In addition, upper primary school students will soon be able to download six National Curriculum linked lessons from the *River Guardians* website. Congratulations to all concerned.

Dolphin Watch is a brilliant example of citizen science and plays a vital role in ensuring that a dolphin population continues to grace our estuaries. Blessed with an innovative team, dedicated hard working volunteers and a program to educate the next generation of Dolphin Watchers, the *Dolphin Watch* project has an amazing future.

Professor Lyn Beazley AO FTSE
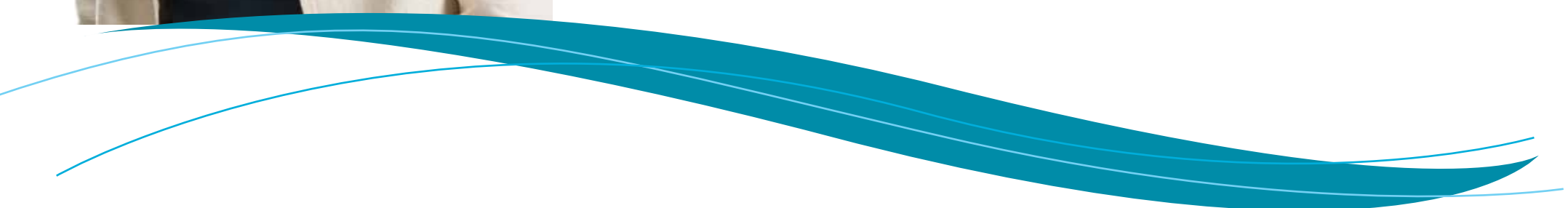
Dolphin Watch scientists and staff

Associate Professor Lars Bedjer – Murdoch University MUCRU Research Leader

Dr Lars Bejder is the Research Leader of Murdoch University's Cetacean Research Unit (MUCRU). His areas of expertise fall into three categories: analysing and developing quantitative methods to evaluate complex animal social structures; evaluating impacts of human activity (coastal development, tourism, habitat degradation) on cetaceans; and fundamental biology and ecology, including assessing abundance and habitat use of marine wildlife. He works closely with wildlife management agencies to optimise the conservation and management outcomes of his research.

Dr Hugh Finn – Murdoch University Post Doctoral Research Fellow, Wildlife Conservation, Conservation Biology

Dr Hugh Finn is a Post-Doctoral Fellow at Murdoch University. His research focuses on black cockatoos and bottlenose dolphins. He became involved with dolphins in the Riverpark during his PhD research in Cockburn Sound and the Swan River from 2000 to 2003. Hugh supervises research students and provides training and support for *Dolphin Watchers* and information and advice to the *River Guardians* team and the community.

Dr Nahiid Stephens – Murdoch University Lecturer/Researcher

Nahiid is a Lecturer in Anatomical Pathology in the School of Veterinary and Life Sciences at Murdoch University. Her research interests include pathology – especially marine mammal and wildlife pathology, disease surveillance in cetaceans, and wildlife as vectors for emerging diseases. As the veterinary pathologist for Murdoch's Marine Mammal Health Project, Nahiid works closely with Dr Carly Holyoake. Their research is focused on investigating mortality events and determining baseline health and epidemiological information on disease levels in marine mammals in Western Australia through opportunistic post-mortem examinations and sampling.

Dr Carly Holyoake – Murdoch University Associate Lecturer/Researcher

Carly is an Associate Lecturer in Wildlife and Conservation Medicine in the School of Veterinary and Life Sciences at Murdoch University. Her research interests include disease surveillance and disease ecology in marine fauna. In collaboration with Dr Nahiid Stephens, Carly established the Marine Mammal Health Project at Murdoch University.

Delphine Chabanne – Murdoch University Research Scientist

Delphine Chabanne is undertaking her PhD with Murdoch University's Cetacean Research Unit (MUCRU) and is working on a Population Assessment project to characterise the population size and structure of dolphins around the Perth region. Delphine's research will help to assess the abundance, habitat use, ranging and residency patterns of dolphins using photo-identification, behavioural sampling, GIS and line transect sampling. Delphine's main research interests focus on the conservation of the Indo-Pacific bottlenose dolphin population in the Riverpark and adjacent waters off Perth. Delphine is currently conducting boat-

based surveys to collect biological and ecological data as well as individual genetic samples in order to improve assessment of the population conservation status of Riverpark dolphins.

Shona Wharton – Murdoch University Honours Student
Shona Wharton is an Honours research student with MUCRU and has completed a Marine Science degree at Murdoch University. Her research includes work within the Coastal Walkabout Project. She is also focusing on dolphins in Perth, including the Swan Canning Riverpark and Bunbury regions.

CURTIN UNIVERSITY

Dr Chandra Salgado Kent – Curtin University Research Fellow Marine Biologist
Dr Chandra Salgado is a Research Fellow with the Centre for Marine Science and Technology. Her main research interests are anthropogenic impacts on marine animals including noise, vocalisation, distribution, migration patterns of marine mammals, and statistical analysis of biological data. Chandra provides presentations and training for *Dolphin Watchers*, supervises research students and collates and analyses the data provided by the volunteers. Recent assignments include analysis of blue and humpback whale vocalisation and experimental design and analysis of studies on ecology and behaviour of marine mammals.

Sarah Marley – Curtin University Research Assistant
Sarah is a research assistant with the Centre for Marine Science and Technology (CMST) at Curtin University. Her main research interests centre around marine mammal behaviour and acoustics, and she has worked on several projects involving blue whales, humpback whales and bottlenose dolphins. One of the projects Sarah is currently working on aims to assess how dolphins use their acoustic environment at various locations. Using a combination of visual and acoustic monitoring methods, Sarah can simultaneously record dolphin sounds and vessel noise from acoustic recorders in the Swan River while also tracking dolphin movements and behaviour from a land-based theodolite station. This will help us to understand aspects of dolphin behaviour in a noisy environment.

Karl Beidatsch – Curtin University
Karl Beidatsch completed his BSc (Honors) in Mathematical Sciences at Curtin University in 2012, after receiving the Statistical Society of Australia (WA Branch) Honours Scholarship. As his honours research project, Karl evaluated the performance of a sophisticated algorithm to predict dolphin distributions in the Riverpark using *Dolphin Watch* data. The method used is called Least Squares Support Vector Machine. It is the first time that this method has been tested in a biological modelling application. This machine learning method was originally developed for ranking webpages by their relevance to search criteria. Karl used *Dolphin Watch* data to test whether we could predict the distribution of dolphins within the Riverpark using presence-only data (survey data where dolphins had been sighted) as well as predict the distribution with presence-absence data (survey data including those with dolphin sightings as well as data where zero dolphins had been sighted). The results indicate that we should continue to collect presence and absence data to have a more robust dataset to test the algorithm. This innovative approach was presented at the Australian Statistical Society Conference.

VOLUNTEERS

Dolphin Watch Data Volunteer – Jennie Hunt

Jennie Hunt collates data from *Dolphin Watch* volunteers and provides weekly reports on the project for the Trust. Jennie has been in this role for almost two years and is an invaluable member of the *Dolphin Watch* team. Jennie also volunteers for Kings Park as a guide and mentor for new volunteers and is an active member of Rotary. Jennie recently received the Black Cockatoo pin from the Department of Parks and Wildlife for her huge contribution to the *Dolphin Watch* project and was a recipient of the 2011 Chief Scientist's Citizen Scientist award for dolphin monitoring.

Dolphin Watch Data Volunteer – Robert Broadway

Robert Broadway assists Jennie Hunt. He wrote the computer program that analyses the data submitted by *Dolphin Watch* volunteers to verify that reports are consistent and complete. The program highlights areas requiring investigation and data is reformatted to make it easy for scientists to analyse. As a result the quality and timeliness of data has improved. Before retiring, Robert worked in the computer industry for many years.

DEPARTMENT OF PARKS AND WILDLIFE

**Douglas Coughran AM
Senior Wildlife Officer, Marine Wildlife Operations, Science and Conservation Division, Department of Parks and Wildlife**

Doug specialises in marine wildlife protection and has extensive experience in marine mammal incident management. He manages whale disentanglement operations in WA and trains interstate conservation staff to national accreditation in this field. He is part of an international network of experienced operation team leaders sharing and contributing to the ongoing improvement of the management of marine mammal incidents. Doug is a member of a committee from twelve countries that provide advice to the International Whaling Commission (IWC) on the welfare of whales entangled in fishing gear. Doug holds the Animal Ethics Licence for Department of Parks and Wildlife (DPaW). Doug facilitates access to beached and stranded cetaceans and other marine wildlife along the coastline of WA for scientific sampling and management of animal welfare. He is identified by the IWC as an expert on the euthanasia of cetaceans, especially large baleen whales and was a participant at a special IWC workshop on cetacean welfare and euthanasia in London, September 2013. Doug is a graduate of Edith Cowan University in Environmental Management and was a Churchill Fellow in 2004. Doug was awarded a Member of the Order of Australia(AM) in the Queen's birthday honours list in 2010.

SWAN RIVER TRUST

Dr Kerry Trayler - Swan River Trust Principal Scientist

Kerry has a background in aquatic ecology and more than 20 years experience working in research, education and management roles. At the Swan River Trust, she is the Principal Scientist and oversees the Swan Canning Research and Innovation Program. She is actively engaged in a wide range of research activities that are focused on the river system including those that are focused on the river dolphins. Kerry is always keen to share information about our river system with the community and is excited by the recent addition of *Prawn Watch* to citizen science opportunities offered through the Trust's *River Guardians* program.

Jason Menzies - Swan River Trust Community Engagement

Program Manager

Jason has been with the Tust for three years and manages the community engagement section. Jason is an environmental scientist with more than a decades experience in delivering community engagement programs that affect positive behavioural change across the Perth community. Jason is responsible for delivering Community Engagement programs at the Trust and assisting with projects such as *Dolphin Watch.*

Marnie Giroud – Swan River Trust River Guardians Program Manager

Marnie Giroud has worked with the Swan River Trust for more than six years in the role of *River Guardians* Program Manager which includes the *Dolphin Watch* project.

Marnie presents to community on *RiverWise* practices including dolphin conservation, trains new *Dolphin Watch* volunteers and coordinates the Trust *Dolphin Watch* team which provides events, education, volunteer management, information and data collation for the Murdoch and Curtin universities' Coastal and Estuarine Dolphin project (CEDP).

Linley Brown – Swan River Trust Education Officer

Linley Brown began working with the Trust in February 2012 and after some time away in 2013, she re-joined the team again in August 2014. Linley manages the *River Rangers* program and *River Guardians* school education program.

Linley educates school students on the importance of river protection and conservation while assisting them with practical projects like planting, water testing and river clean ups. Linley is currently trialling *Junior Dolphin Watch* with the *Dolphin Watch* team.

Rachel Hutton – Swan River Trust Community Engagement Officer

Rachel Hutton has worked with the Trust for more than seven years in the role of Community Engagement Officer which incorporates the *River Guardians* program and *Dolphin Watch* project. Rachel creates *River Guardians* publications, contributes to community engagement initiatives, helps manage volunteers, provides information for the team and coordinates events and presentations for the Trust and *River Guardians*. Rachel coordinates *Dolphin Watch* training events and the annual Dolphin Watch Day.

Carol Logue - Swan River Trust Communications Support Officer

Carol Logue joined the Swan River Trust this year in the role of Communications Support Officer working with staff to deliver the *River Guardians* program and *Dolphin Watch* project. Carol works on administrative tasks for *Dolphin Watch* volunteers and the general membership and assists events for the *River Guardians* program.

Dolphin Watch Project

The Swan River Trust, Murdoch and Curtin universities and Department of Parks and Wildlife have been working together for five years on the *Dolphin Watch* project, a social science research and education project recording the activities of bottlenose dolphins in the Riverpark. Information from *Dolphin Watch* supports the CEDP, a long-term study of the health and ecology of dolphins in the Riverpark and Perth area.

Dr Chandra Salgado and Sarah Marley from Curtin University and Dr Hugh Finn, Dr Carly Holyoake, Dr Nahiid Stephens, Dr Lars Bejder and Delphine Chabanne from Murdoch University are leading the research into the dolphin community in the Riverpark. Part of this research is investigating how environmental changes in the rivers and human activities affect the dolphin community. Coastal Estuarine Dolphin Project researchers work with *Dolphin Watch* volunteers, who are part of the Trust's *River Guardians* program, to monitor the movement and behaviour of the dolphins.

Community involvement is a great boost to this research and allows information to be gathered on how dolphins use the Riverpark.

Dolphins playing in the rivers are an iconic and much loved sight, but their habitat and the dolphin community itself could be at risk. The Riverpark dolphin community is small and dependent on a handful of females. They inhabit an urban environment which places a lot of stress on the mammals. Dolphins living in an estuarine environment can experience pressure from rapid salinity changes, loss of habitat, decreasing prey,

Image by S. Allen

algal blooms, entanglement, boat strikes, rubbish and noise.

The Trust continues to urge Perth residents to look after the Riverpark to minimise stress on the dolphins and other native wildlife. The public can play an invaluable role in monitoring this iconic species. Becoming a member of the *River Guardians* program allows community members to get directly involved in protecting these mammals. *River Guardian* members can train to become *Dolphin Watch* volunteers. With more than 700 trained *Dolphin Watchers* observing dolphins, the information is helping to provide more observations to be analysed by research scientists.

Observations are now being logged online via the new *Dolphin Watch* App, which is available to download for free on iPhone and Android. The introduction of the App has made it easier to submit observations and has contributed to more than 10,000 records being submitted.

The App allows images and video to be taken. Volunteer photographs and vision help build a picture of the community of dolphins in the system at present and provide valuable source material for *FinBook*.

Dolphin Watch volunteers also record dolphin sightings and submit photos to the Trust and the Department of Parks and Wildlife to assist dolphins in trouble in the estuary.

The *Dolphin Watch* project will continue to develop and change over time to expand research capabilities and to encourage volunteers to participate through online monitoring and other initiatives.

Image by D. Chabanne

Junior Dolphin Watch

We are excited to announce a new initiative as part of the *Dolphin Watch* project. The *River Guardians* team have received many requests over the last few years for teacher resources, class assistance and the opportunity for children to monitor dolphins through the *Dolphin Watch* project.

Junior Dolphin Watch has been developed by *River Guardians* Education Officer Linley Brown who has created exciting and dynamic teacher resources linked to the new National Curriculum to help teachers educate children about the Riverpark and the dolphins that live in it.

Resources are now freely available on the *River Guardians* website.

Teachers have been trialling the lessons and loan out box and the Trust has responded to their feedback.

Interested teachers attended a special *Dolphin Watch* Teacher Training session and signed up as a *Dolphin Watch* school.

As part of the project teachers receive:

- free *Dolphin Watch* training incursion for their students
- National Curriculum linked teacher resources
- loan of *Dolphin Watch* kit box of resources
- on-going support and help from the *River Guardians* Education Officer

If you are a teacher and interested in getting your students involved in *Junior Dolphin Watch* please contact the *River Guardians* Education Officer.

Email **guardians@swanrivertrust. wa.gov.au** or phone **9278 0900**

Image by R. Hutton

FinBook

FinBook

4th Edition - June 2014

An identification catalogue for dolphins observed in the Swan Canning Riverpark

FinBook is a catalogue of dolphins observed within the Riverpark. It has been created by Delphine Chabanne and Dr Hugh Finn. The fourth edition includes 28 dolphins, including six dependent calves observed in the Riverpark. This year, Finbook is divided into four sections according to the dolphin's age-sex classes and their most recent observations in the Riverpark.

It is important that all the dolphins that use the Riverpark are identified, so their long-term welfare can be monitored. *FinBook* gives everyone the ability to participate in this process. Using *FinBook*, community members can recognise individual dolphins and contribute information to assist in monitoring of these unique residents of Perth's rivers.

Dolphins can be identified by the markings and nicks that are present on their dorsal fins. Many of these markings are permanent, which allows individual animals to be monitored over many years. Some dolphins are hard to identify because they lack dorsal fin markings and they are known as clean fins.

FinBook is like a catalogue of fin-prints for dolphins. It shows the right and left sides of each dolphin's dorsal fin. *FinBook* also describes other unique features that can be used to identify individuals.

To download a free copy of *FinBook*, visit the Identifying Dolphins page in the *Dolphin Watch* section of the *River Guardians* website www.riverguardians.com.
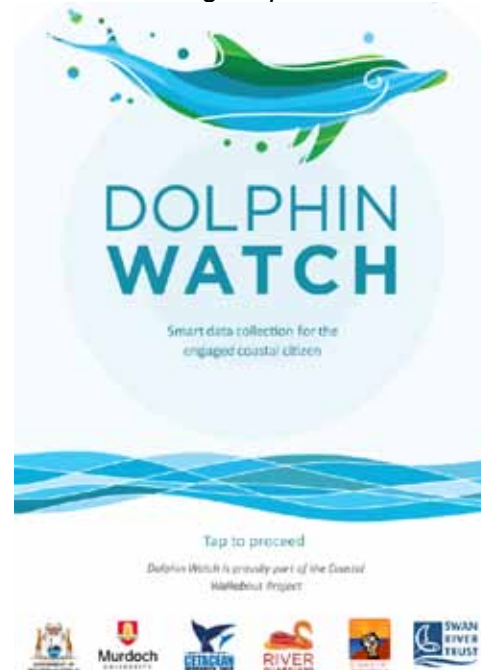
Dolphin Watch App

At the start of 2014, the *Dolphin Watch* smart phone application (App) was released for iPhone and Android, providing a mobile option for *Dolphin Watch* volunteers.

The App provides a simple and environmentally friendly online monitoring process for volunteers to log their sightings. This enables volunteers to quickly and easily log their observations and allows Trust staff to collect volunteer hours logged for submission to the Department of Parks and Wildlife's Community Involvement Unit.

The quality of data continues to improve with more volunteers completing all parts of the monitoring form whether they see dolphins or not. This has aided the research by providing a full data set. Having this extra information helps researchers understand where high concentrations of dolphins are occurring rather than just relying on sightings. The Trust receives many photographs and some videos of dolphins spotted in the Riverpark by *Dolphin Watch* volunteers. Photos and details of where and when they are taken will help researchers determine animals that are using the Riverpark on a constant basis.

Dolphin Watch volunteers have access to the survey functionality, which was the prime purpose of creating the App. The dolphin sightings add context to the survey data and also provide additional information that can be used for *Dolphin Watch* and other projects.

Dolphin Watch is a project under Coastal Walkabout (www.coastalwalkabout.org). The technology team behind the project at Gaia Resources worked with staff and volunteers from the *Dolphin Watch* project to ensure that the App would benefit the volunteers, and also deliver data into the existing *Dolphin Watch* database.

Once the initial development was undertaken, the App was solidly tested by *Dolphin Watch* volunteers over an intense two week period. This testing was highly valuable as it identified areas of the initial version of the App that required further work. It also gave the team behind *Dolphin Watch* a range of feedback on the methods being used for surveys. Much of the feedback on the App was incorporated into the final version.

The final version of the App was launched by Professor Lyn Beazley, formerly the Western Australian Chief Scientist and a long time *Dolphin Watch* supporter, at a special event on the 20 February 2014. The latest intake of new *Dolphin Watch* volunteers were also given an overview of the App at the training session 24 March 2014.

Since the App was launched we have received almost 200 dolphin sightings and surveys on the Swan and Canning rivers. Dolphins have been sighted as far upstream as Rivervale in the Swan River, and Wilson in the Canning River, and all the way to the mouth of the river in Fremantle. The data is now flowing into the *Dolphin Watch* database and adding to our understanding of the dolphin populations in the Swan and Canning rivers.

We will be providing more feedback to our *Dolphin Watch* volunteers on the data coming in from the App in the coming newsletters.
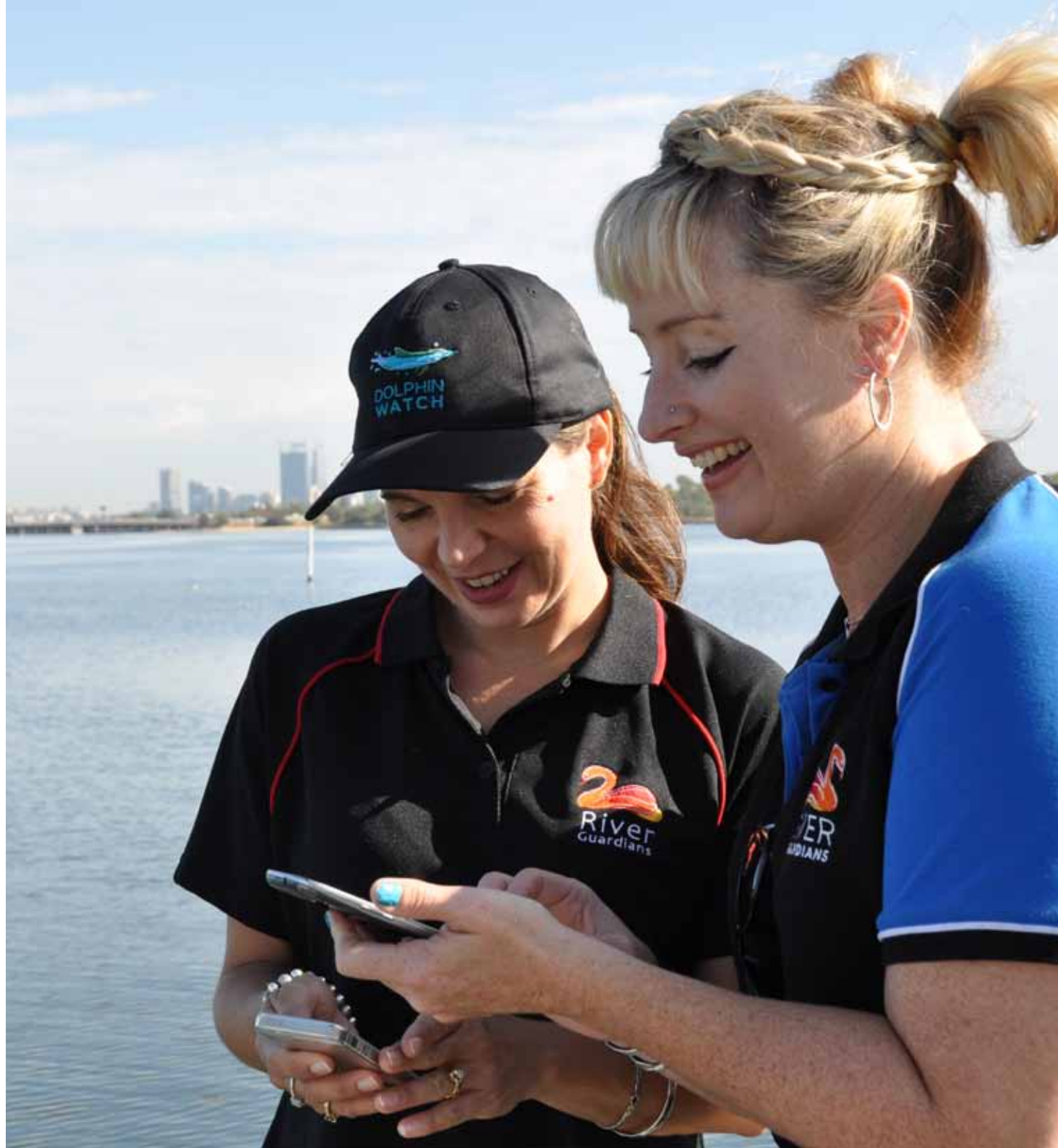
The App is available from the Google Play and iTunes stores for free. You can use a QR code reader on your phone to download it by pointing it at the codes on the next page.

Android QR code

iTunes QR Code

Image by M. Holker

Caring for dolphins

When out, on or around the Riverpark there are four simple things you can do to help care for our dolphins.

Dolphins are part of the Riverpark and we all need to look after them by caring for their habitat. For river conservation tips check out our website at www.riverguardians.com

Slow down for dolphins – dolphins often form resting groups in the middle reaches of the estuary, so keep an eye out for dolphins, and slow down if you spot any.

Take your rubbish home – dolphins, particularly calves, can get entangled in fishing line. Make sure you dispose of unwanted line carefully and look out for the Trust's fishing line disposal bins.

Enjoy dolphins from a distance – never approach a wild dolphin. It is illegal to disturb or harass dolphins under the *Wildllife Conservation Act (1950)*. Boat-based observers should stay at least 100-150 metres away from dolphins and not attempt to approach them. Shore based observers should also take care to avoid disturbing river dolphins.
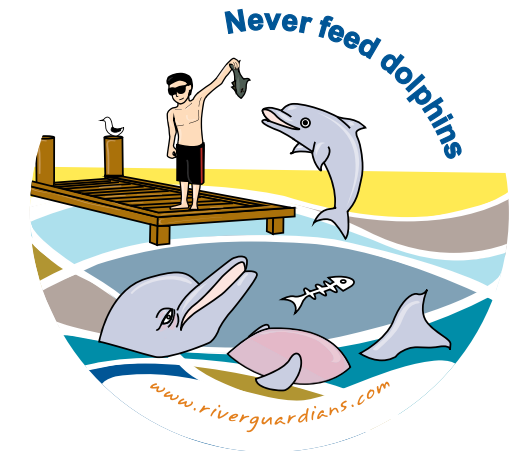
Never feed dolphins – it is illegal and leaves dolphins vulnerable to entanglement, boat strikes, and disease when they come into close contact with humans and boats.

Reel It In campaign

You might remember the sad story of one of our resident dolphins, Gizmo, getting fishing line entangled around his dorsal fin in 2012. Fortunately, the Water Police were able to intervene and save Gizmo in this instance but it got us thinking, we had to do something about fishing line waste in the Riverpark.

In late December, the Swan River Trust launched a new initiative, the *Reel it In* campaign, to help stop fishing line entangling dolphins, pelicans and other wildlife in the Riverpark.

The Trust has joined forces with Recfishwest, Native Animal Rescue, Keep Australia Beautiful's Clean Marine campaign and seven riverfront councils to install fishing line disposal units at popular recreational fishing locations throughout the Riverpark. It is hoped the project will stem the impact discarded fishing waste has on wildlife and our rivers.

As part of the pilot project, the Trust has installed 22 dedicated fishing line disposal units at jetties, fishing platforms, traffic bridges, yacht clubs and boat ramps around the Riverpark – including popular sites on both the Swan and Canning rivers, such as Garratt Road bridge, the Narrows Bridge and Point Walter Jetty. For a full list of locations, please visit www.riverguardians.com/projects/fishing-line-disposal-units.

Made of 100 per cent recycled plastic, the bins provide a safe and easy way to dispose of unwanted fishing line, tackle, bait bags and other related waste.

Students from *River Rangers* schools will adopt fishing line disposal units and audit bin contents with assistance from the Trust's Education Officer and Native Animal Rescue – the organisation responsible for emptying the bins and auditing their contents on a weekly basis.

The Trust has also supplied units to the Fremantle Port Authority, Cockburn City Council and riverfront yacht clubs to help reduce the amount of fishing line waste that is being discarded around these popular fishing locations.

Image by S. Allen

Underwater noise

The behavioural and acoustic responses of coastal dolphins to noisy environments

specialisations for auditory comprehension and sound production underwater. This allows them to overcome the challenges of limited vision and instead use sound for a series of vital processes such as orientation, communication and foraging. However, these auditory adaptations also make cetaceans especially susceptible to impacts from high levels of noise pollution.

Exposure to underwater noise has been found to impose a variety of impacts on marine mammals, ranging from minimal short-term effects to severe long-term consequences. Several studies have previously investigated the responses of marine mammal species to vessel noise exposure, and have found evidence of behavioural, acoustical, and physiological responses. At low levels, such noise pollution may be merely detectable to marine mammals or cause behavioural changes; however, at higher levels it may interfere with animal communication and detection of acoustic signals, or even affect the auditory system resulting in physical damage.

Multiple populations of dolphins occur around the coast of Western Australia. These dolphins occupy a diversity of habitat types and consequently many communities have become specialised to their unique environments – such as the bottlenose dolphins of the Riverpark. Although the species itself is widely distributed, small community size and limited genetic exchange rates make bottlenose dolphin communities vulnerable to environmental changes and noise pressures.

Did you know researchers are listening to and recording dolphin sounds in the Swan and Canning rivers?

The overall aim of this project is to identify the behavioural and acoustical responses of coastal dolphins in environments rich in underwater noise. To achieve this objective, a range of visual and acoustic techniques is being implemented in areas of high dolphin density in the Riverpark.

Underwater acoustic loggers developed by the CMST at Curtin University are being deployed at strategic locations in the Swan and Canning rivers. The data collected by these loggers can be used to investigate the acoustic environment of the

The ocean and rivers are a surprisingly noisy place. The marine acoustic environment consists of naturally occurring ambient sounds, such as sounds generated from wind, waves and currents. There are also numerous biological sounds, produced by marine mammals, fish, and even invertebrates. There are also anthropogenic sounds from human activities, such as vessel traffic and marine construction.

Due to the gradual loss of intensity of light in water, many marine species rely on acoustics to investigate their environment, as sound travels farther and faster in water than in air. Cetaceans show the most elaborate and extreme

Riverpark, the characteristics of dolphin sounds, and any acoustical changes in dolphin behaviour in areas of varying noise levels.

Visual monitoring is being conducted at different land-based vantage points in the Riverpark to coincide with acoustic recording sites. Using a theodolite, dolphin movements in the Riverpark can be recorded enabling changes in speed, travel direction, surfacing frequencies, and dive durations to be calculated. The predominant behavioural activity of observed dolphin pods will also be recorded with focal follows aimed at recording fine-scale behavioural events such as foraging, resting, socialising and traveling.

By combining data from both visual and acoustic monitoring, information on the acoustic soundscape of the Riverpark will be obtained, our knowledge of dolphin acoustic signals will be improved, and any detectable physical or acoustical changes in dolphin behaviour in areas of varying underwater noise levels will be examined.

Image by H. Raudino

Research findings 2013-14

Dolphin Watch surveys (2009-2014)

To collate data for the 2014 *Dolphin Watch* Annual Report, we analysed 9425 (98 per cent) of the 9634 surveys submitted from the beginning of the *Dolphin Watch* project in mid-2009 up until 14 February 2014. The 209 surveys that were not analysed had dates or times that were incorrect and could not be rectified.

Surveys in 2013

Dolphin Watch observations in 2013 were similar to 2012, with a total of 3390 surveys sheets submitted (Figure 1), compared with 3379 the previous year.

Of the 3390 surveys in 2013, dolphins were sighted in 19 per cent of surveys. This percentage is comparable to surveys with dolphins sighted during 2011 and 2012, 18 per cent and 19 per cent, respectively.

Observer effort

The total effort in hours that Dolphin Watchers spent searching for dolphins in 2013 was slightly less than in 2012, 2766 hours in 2013 compared with 2910 hours in 2012, but was still greater than in previous years (Figure 2). The total effort is similar to one person being employed full time solely to do dolphin observations.
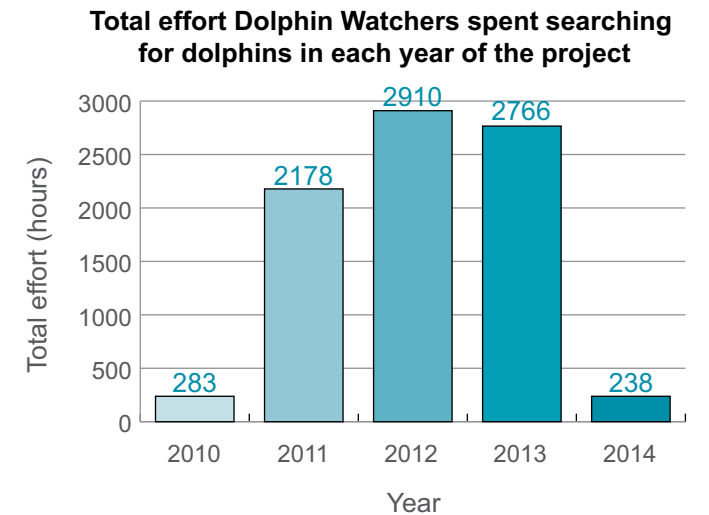

Number of dolphin surveys

Figure 1. Number of surveys submitted by Dolphin Watchers since the beginning of the *Dolphin Watch* project (blue bars represent surveys in which dolphins were observed, grey bars represent surveys in which dolphins were not observed). The year 2014 includes data up until mid-February only.

Total effort Dolphin Watchers spent searching for dolphins in each year of the project

Figure 2. Total effort Dolphin Watchers spent searching for dolphins in each year of the project, as consistent effort began to be recorded in April 2010, 2009 was not included in this figure; 2014 includes data up until mid-February only.

Dolphin sightings

In 2013, the total number of dolphin sightings was comparable to the number sighted in 2012 with 1800 dolphin sightings in 2013 compared with 1816 dolphin sightings in 2012 (Figure 3). The number of sightings in 2012 and 2013 were more than double those of 2009 and 2010, and just under double those sighted in 2011. From 1 January to mid-February of 2014 there were already 118 sightings – a tenth of those sighted during the previous year.
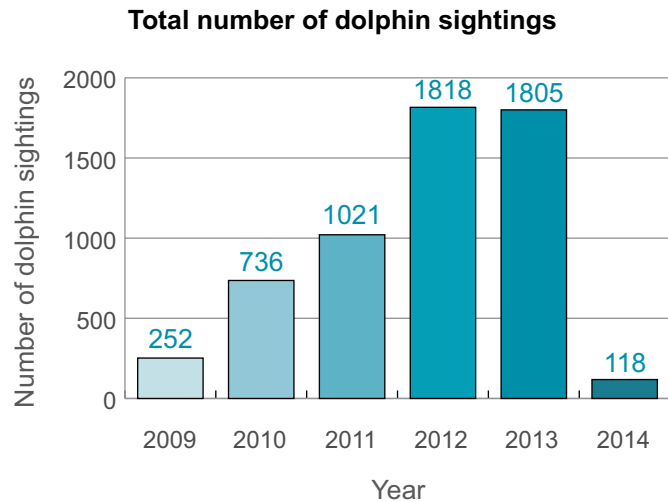
Total number of dolphin sightings

Figure 3. Total number of dolphin sightings, the total counts of dolphins across all surveys in which dolphins were observed, made during each year of the project (2014 includes data up until mid-February only).

Observations per day

The number of dolphins observed per day was the same during 2012 and 2013, and only slightly greater than in 2011 and 2014 up until mid-February (Figure 4).
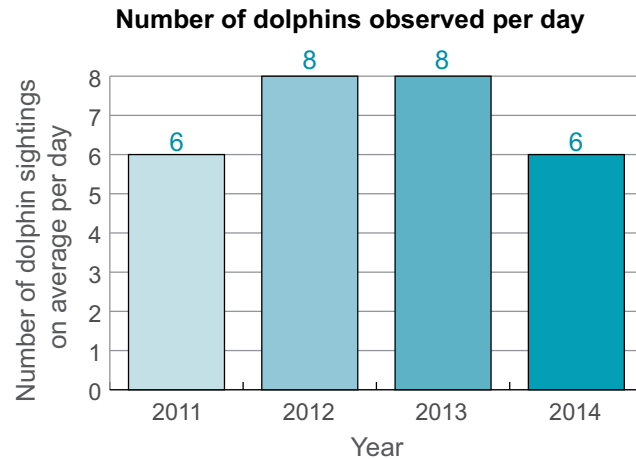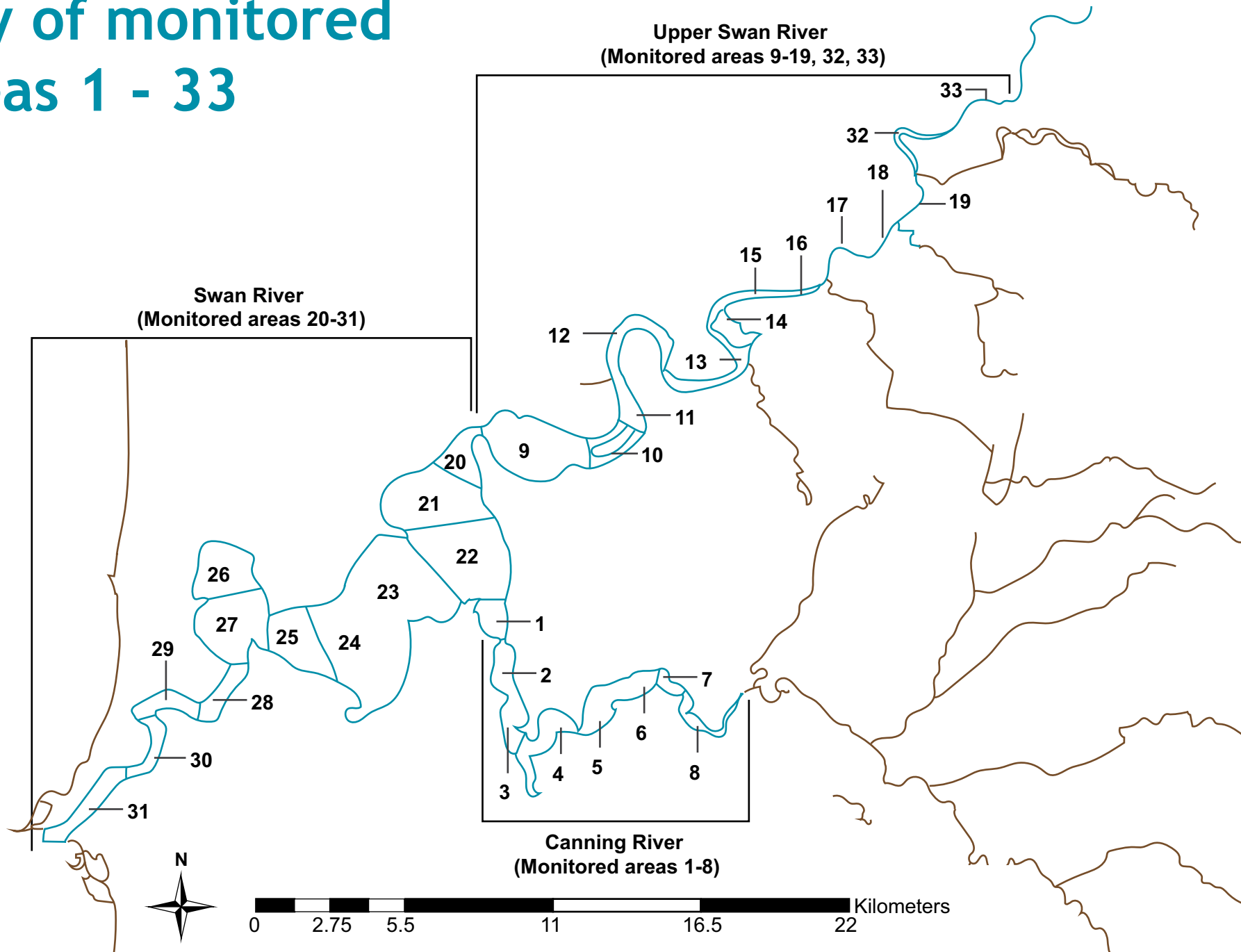
Number of dolphins observed per day

Figure 4. The average total number of dolphin sightings per day (i.e. the total counts of dolphins across all surveys in which dolphins were observed) made during each year of the project in which effort was consistently recorded (2014 includes data up until mid-February only).

Observer effort across monitoring area

The greatest effort spent searching for dolphins from 2011-2014 was in monitoring area 13 (Figure 5), with a total of 1551 hours spent from January 2011 to February 2014. During this period the fewest number of hours spent in any monitoring area was 15 hours in zone 33.

If the number of dolphins observed is standardised by the number of hours of observer effort, we get the number of dolphins observed per hour of observer effort. From 2011-2014, the greatest number of sightings of dolphins per unit effort was in the Fremantle Inner Harbour, monitoring area 31, and the area between Matilda Bay and the Narrows Bridge, monitoring areas 20 and 21. Monitoring area 6 in the upper reaches of the Canning River also produced relatively large numbers of sightings per unit search effort.

Key of monitored areas 1 - 33

Upper Swan River
(Monitored areas 9-19, 32, 33)

33

32

18

17   19

15   16

12   14

Swan River
(Monitored areas 20-31)

13

11

20   9   10

21

22

26

27   25   23

29   24

28   1

30   2   7

31   3   4   5   6   8

N

Canning River
(Monitored areas 1-8)

0   2.75   5.5   11   16.5   22   Kilometers

Areal breakdown to Dolphin Watch monitoring 2011 - 2014
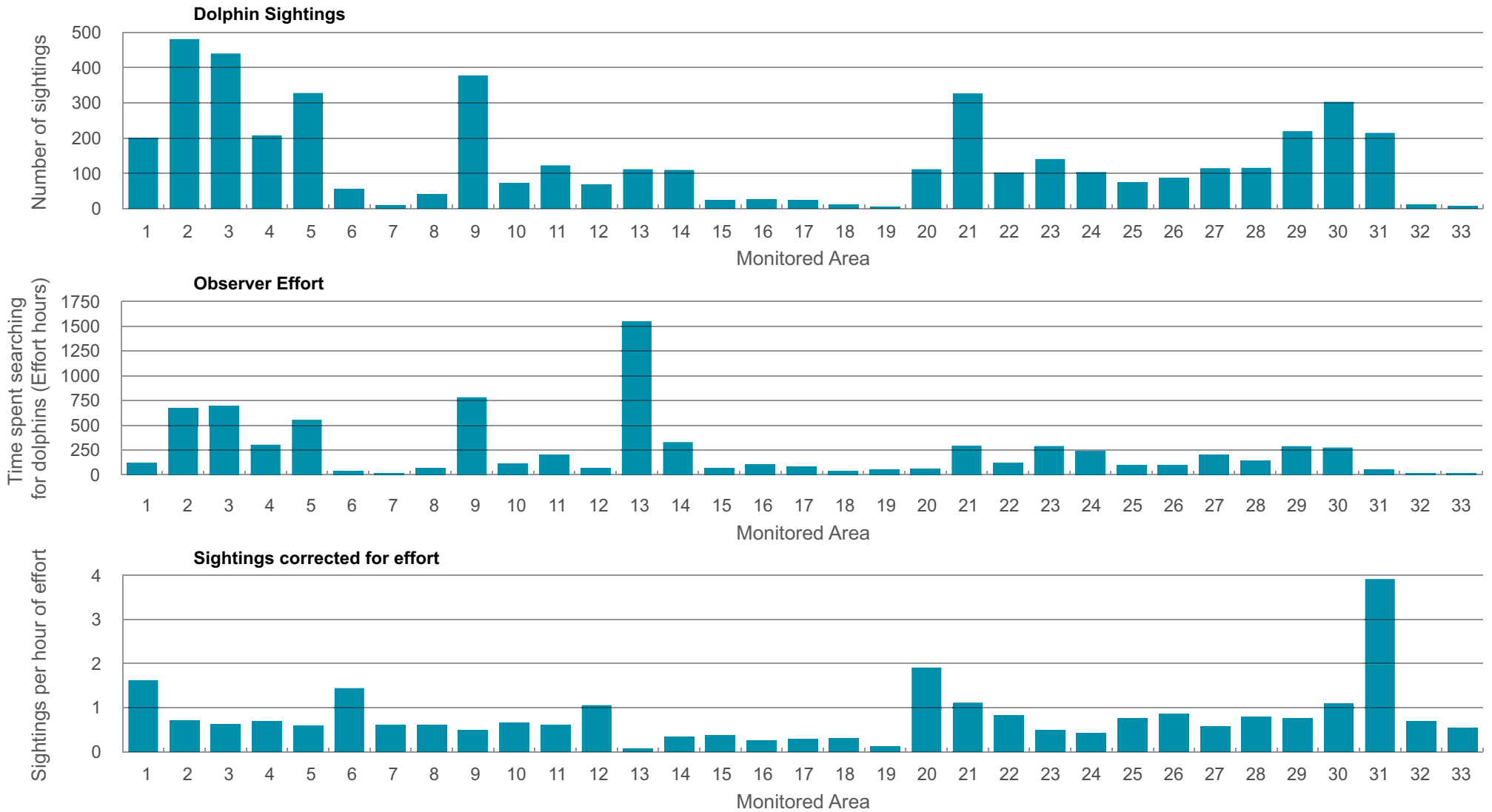
Figure 5. Areal breakdown of monitoring data over the period from 2011 to 2014 (2009 and 2010 were not included since not all effort was recorded from 2009 to April 2010). The year 2014 includes data up until mid-February only.
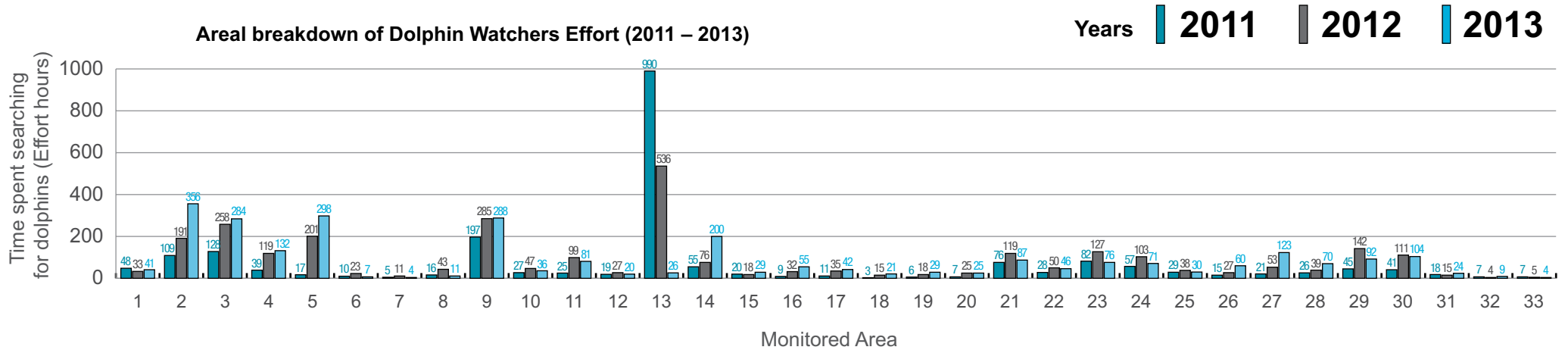
Figure 6. Areal breakdown of Dolphin Watcher effort 2011-13 across the 33 monitoring areas (2009 and 2010 were not included since not all effort was recorded from 2009 to April 2010). The year 2014 is excluded here since the data set analysed only included up until mid-February.

Monitoring area 14 had an increased level of effort by Dolphin Watchers in 2013 (Figure 6). Monitoring areas 2 to 5 and 9 also had fairly consistent and relatively high level search effort throughout the project period. Monitoring areas with the least effort included areas 6, 7, and 15 to 20. Neither site increased in in 2013. Area 13 showed a drop in effort which may be a function of the low sighting rate.

When and where were dolphins observed the most?

If we standardise the number of dolphins observed by the number of hours spent searching for dolphins, we can determine peaks in the occurrence of dolphins that are consistent over years. However, it is important to consider the number of surveys that the data is based on – if there are very few surveys for a zone, we may not get an accurate result. We could have greater confidence in patterns of occurrence if we increased effort in less well-surveyed areas. Zone 31 consistently has had the highest sightings across 2011-13. Some of the more well-surveyed monitoring areas had coinciding peaks in the average numbers of dolphins sighted per hour searching. These included zones 30 and 31, Fremantle Inner Harbour, and zones 20 and 21, particlularly in 2012 and 2013 (Figure 7). Low observer effort in zone 6, 10 hours in 2011 and 7 hours in 2012, makes it difficult to determine whether the peaks in sightings observed in 2011 and 2013 represent a trend in a greater occurrence of dolphins in this area than in surrounding areas. Greater observer effort in this zone during 2014-15 would be helpful.
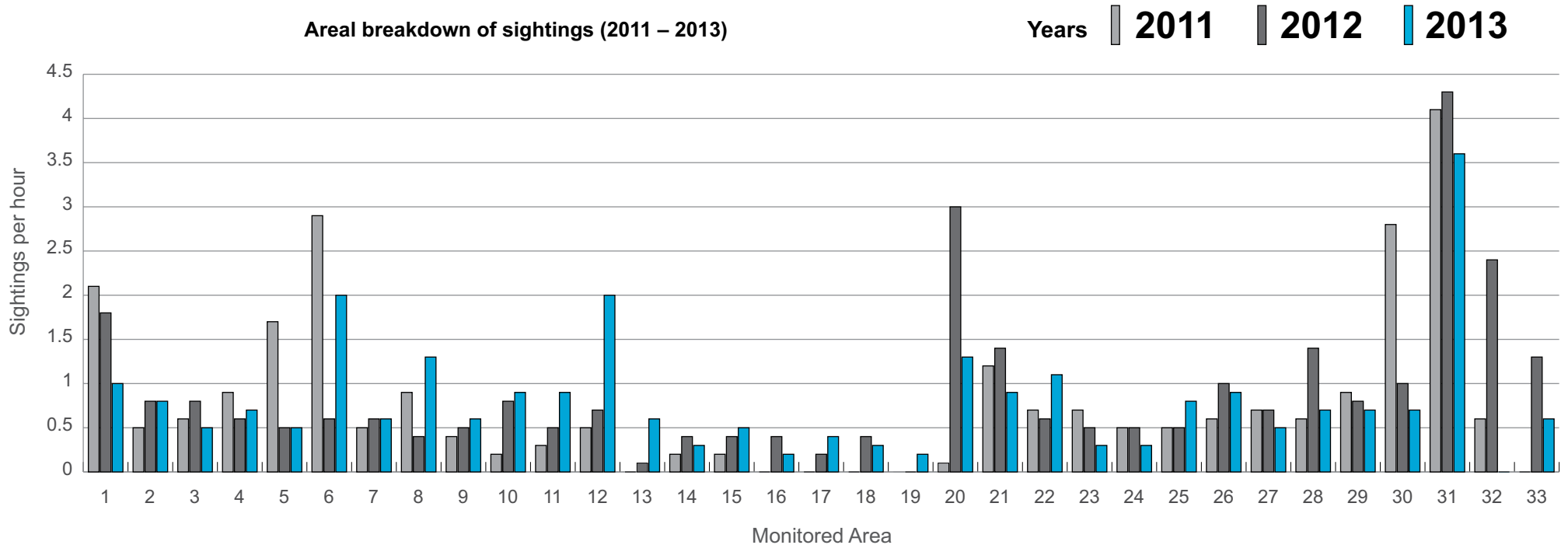
Figure 7. Areal breakdown of sightings (i.e. the average total counts of dolphins corrected by the total hours spent searching) in each year of the program in the 33 monitoring areas (2009 and 2010 were not included since not all effort was recorded). The year 2014 is excluded here since the data set analysed only included up until mid-February.

In the Fremantle Inner Harbour, monitoring area 31, peaks in the number of dolphins sighted per hour of search effort, from 2011 and 2013, occurred in March, April, May in the autumn months and again in July in winter (Figure 8 and Figure 9). In the area between Matilda Bay and the Narrows Bridge, monitoring areas 20 and 21, peaks occurred in June, July, and August in the winter months for 2011-2013. In the upper Canning River, monitoring area 6, peaks occurred in April and May, and again in November during autumn and spring.
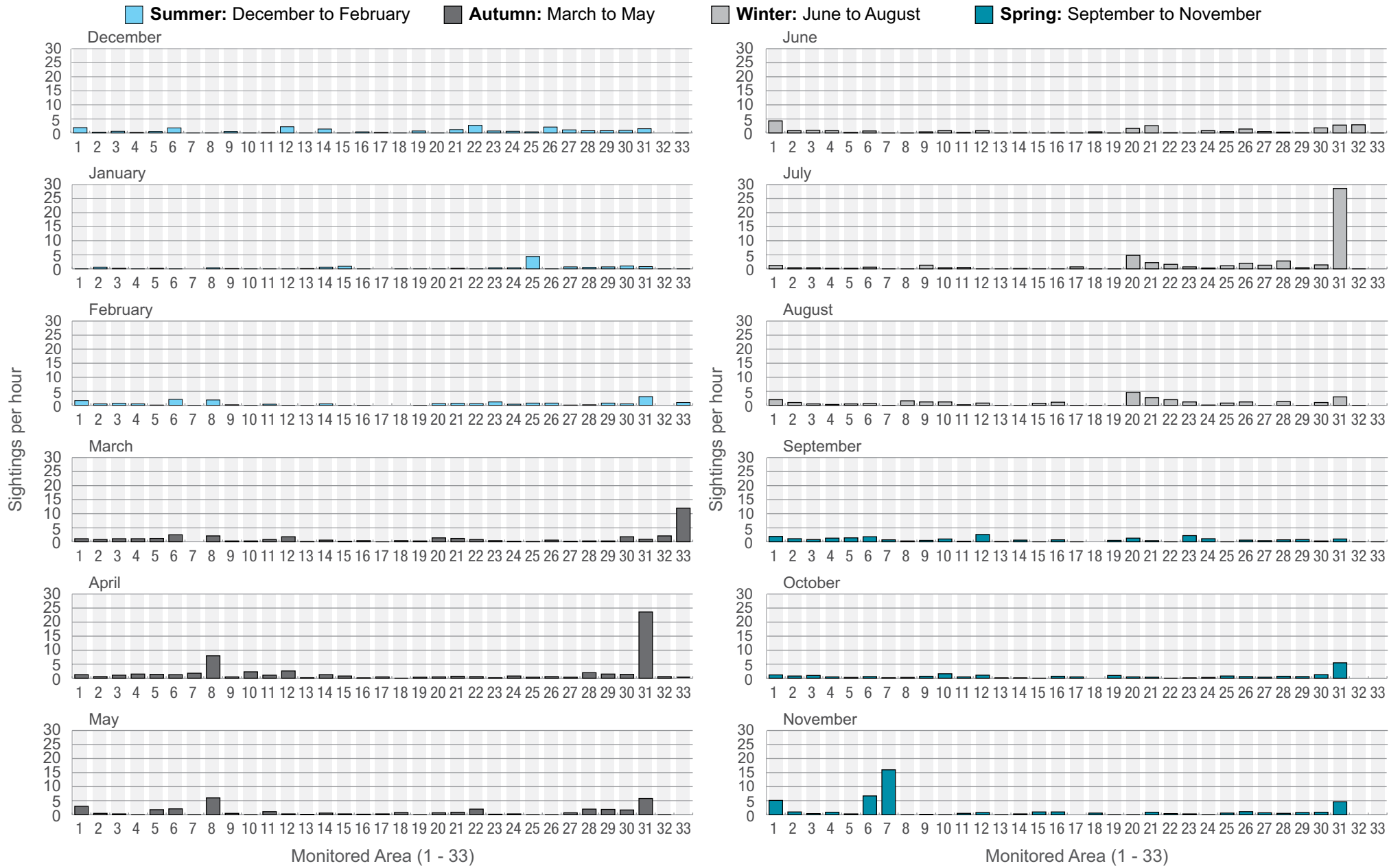
Figure 8: Total average dolphin sightings per hour (i.e. the average total counts of dolphins corrected by the total hours spent searching) in the 33 monitoring areas over the 12 months of the year (2009 and 2010 were not included since not all effort was recorded. The year 2014 was also excluded here since the data set analysed only included up until mid-February).

Comparison with vessel-based surveys
We compared the relative number of sightings per hour of search effort by Dolphin Watchers to those made with vessel surveys by university researchers in 2013. Vessel survey sightings were per kilometre of search effort, so all values were re-scaled from 1 to 100 so that the relative numbers could be compared (Figure 10, Figure 11).

The two approaches – *Dolphin Watch* and vessel-based survey – both indicated that certain monitoring areas have higher dolphin sighting rates. These areas include: the Fremantle Inner Harbour, Freshwater Bay, the area between Matilda Bay and the Narrows Bridge. These areas of peak sightings per unit effort occurred in the *Dolphin Watch* and vessel survey data in 2013, as well as in the *Dolphin Watch* survey data including complete years of 2011, 2012 and 2013.

Image by W. Theobold

Total average dolphin sightings per hour in Canning River (monitored areas 1-8)
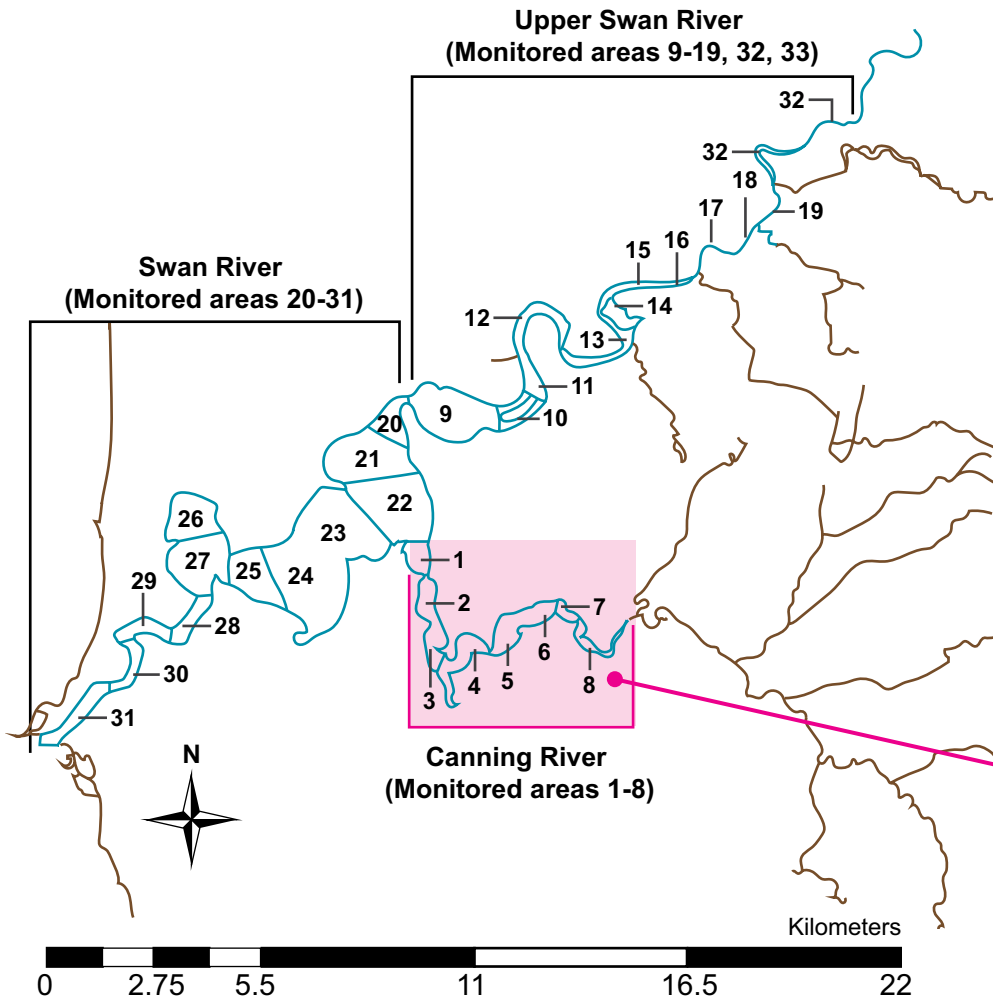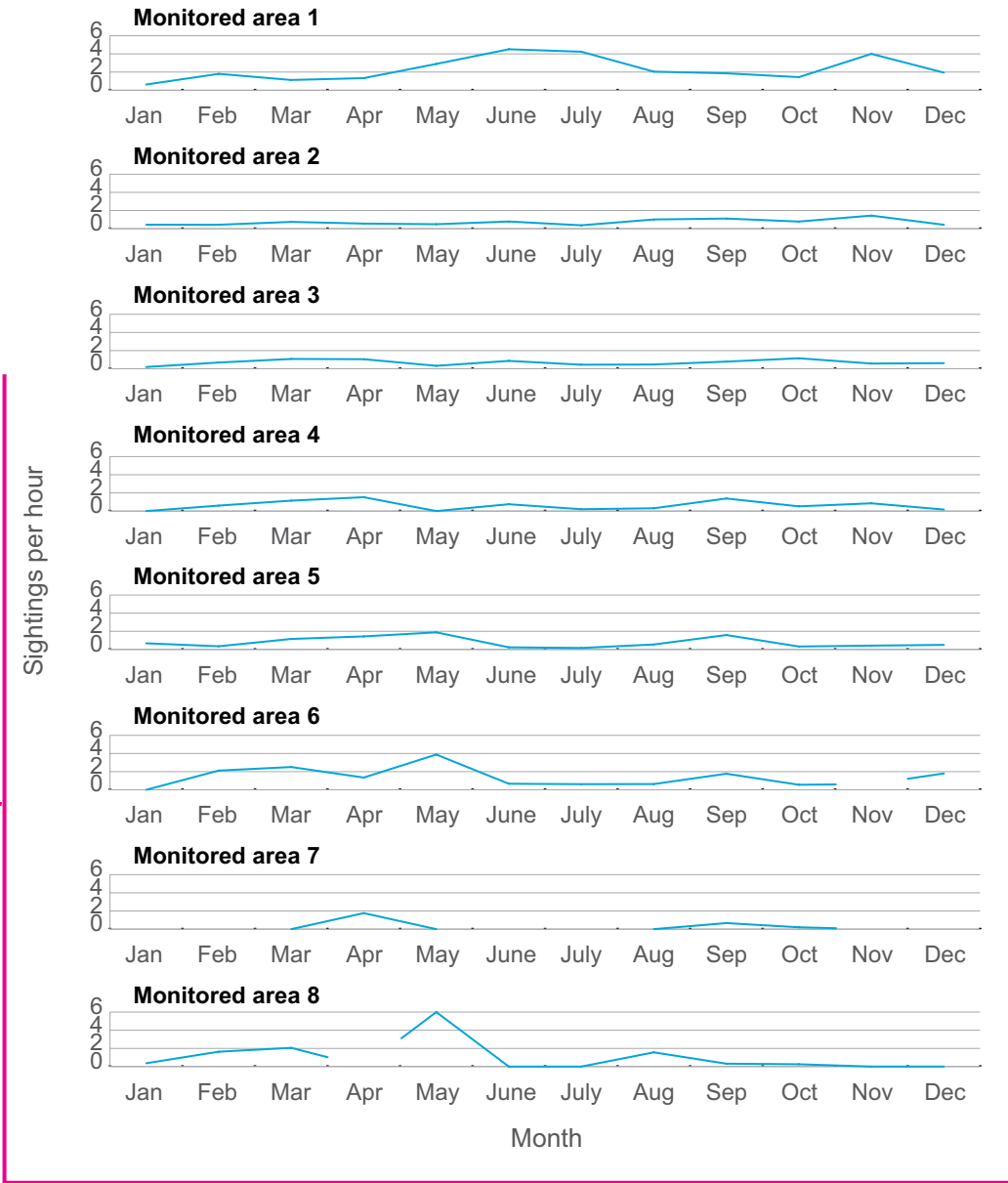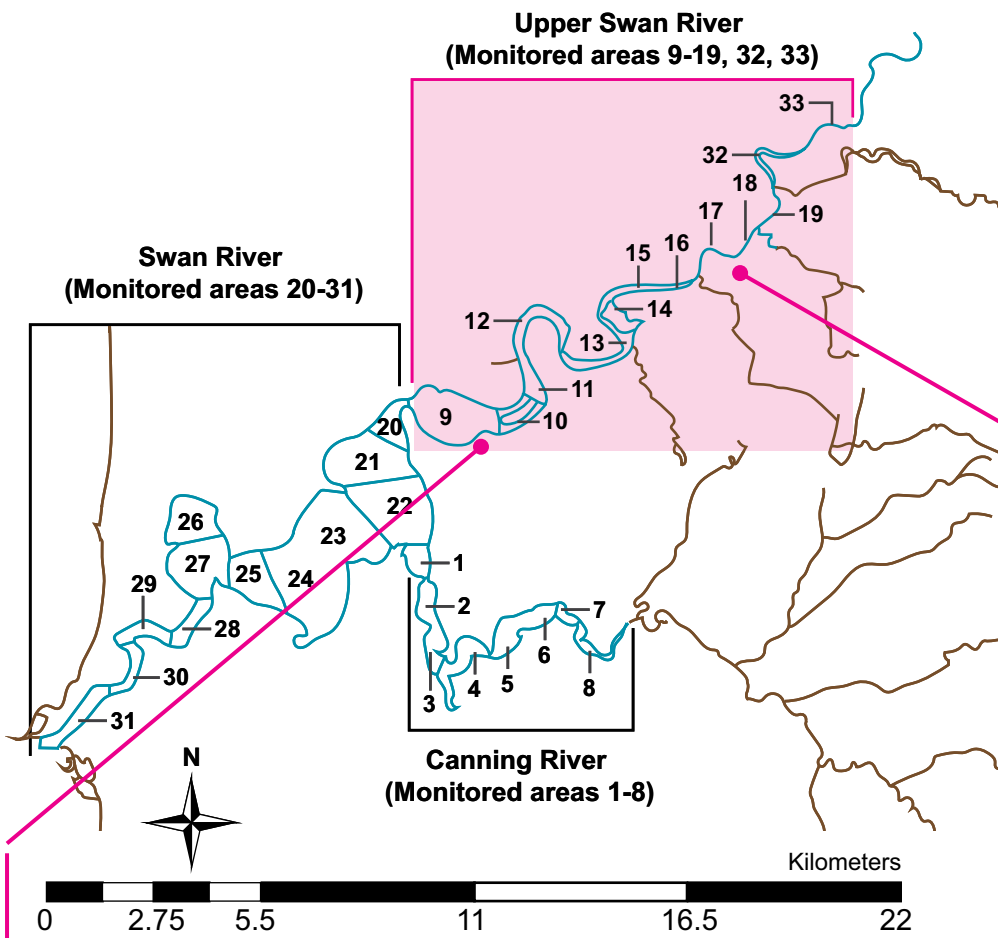

Figure 9a

Figures 9a-c. Total average dolphin sightings per hour (i.e. the average total counts of dolphins corrected by the total hours spent searching) in the 33 monitoring areas over the 12 months of the year (2009 and 2010 were not included since not all effort was recorded. The year 2014 was also excluded here since the data set analysed only included up until mid-February). Graphs with the total relative sightings per hour made by Dolphin Watchers between the years 2011 and 2013.

**Total average dolphin sightings per hour
in Upper Swan River (monitored areas 9-19, 32, 33)**

**Upper Swan River
(Monitored areas 9-19, 32, 33)**

**Swan River
(Monitored areas 20-31)**

**Canning River
(Monitored areas 1-8)**

N

Kilometers

0   2.75   5.5   11   16.5   22

**Upper Swan River (Monitored area 9 - 19, 32, 33),
areas 9 and 10 shown below**

Monitored area 9

Monitored area 10

**Upper Swan River (Monitored area 11 - 19, 32, 33)
areas 11 - 19, 32 and 33 shown below**

Monitored area 11

Monitored area 12

Monitored area 13

Monitored area 14

Monitored area 15

Monitored area 16

Monitored area 17

Monitored area 18

Monitored area 19

Monitored area 32

Monitored area 33

Sightings per hour

Month
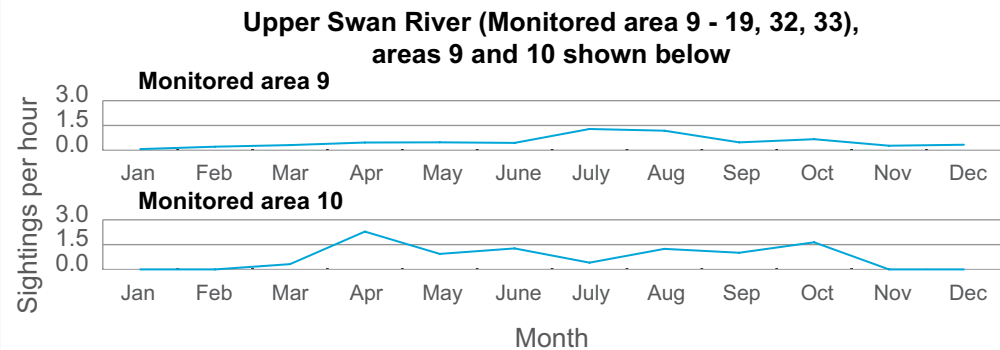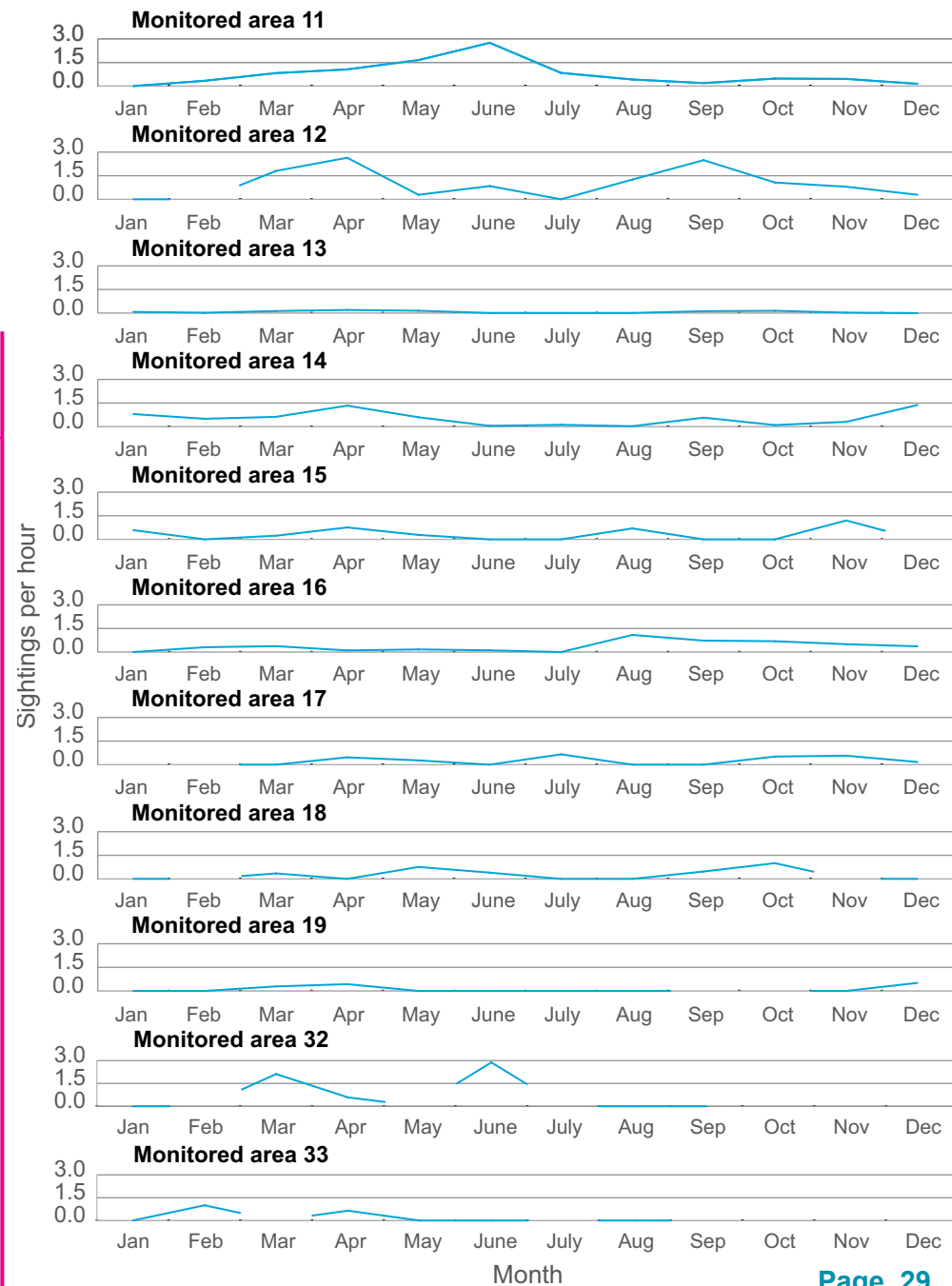
Figure 9b

**Total average dolphin sightings per hour
in Swan River (monitored areas 20-31)**

**Upper Swan River
(Monitored areas 9-19, 32, 33)**

**Swan River
(Monitored areas 20-31)**

**Canning River
(Monitored areas 1-8)**
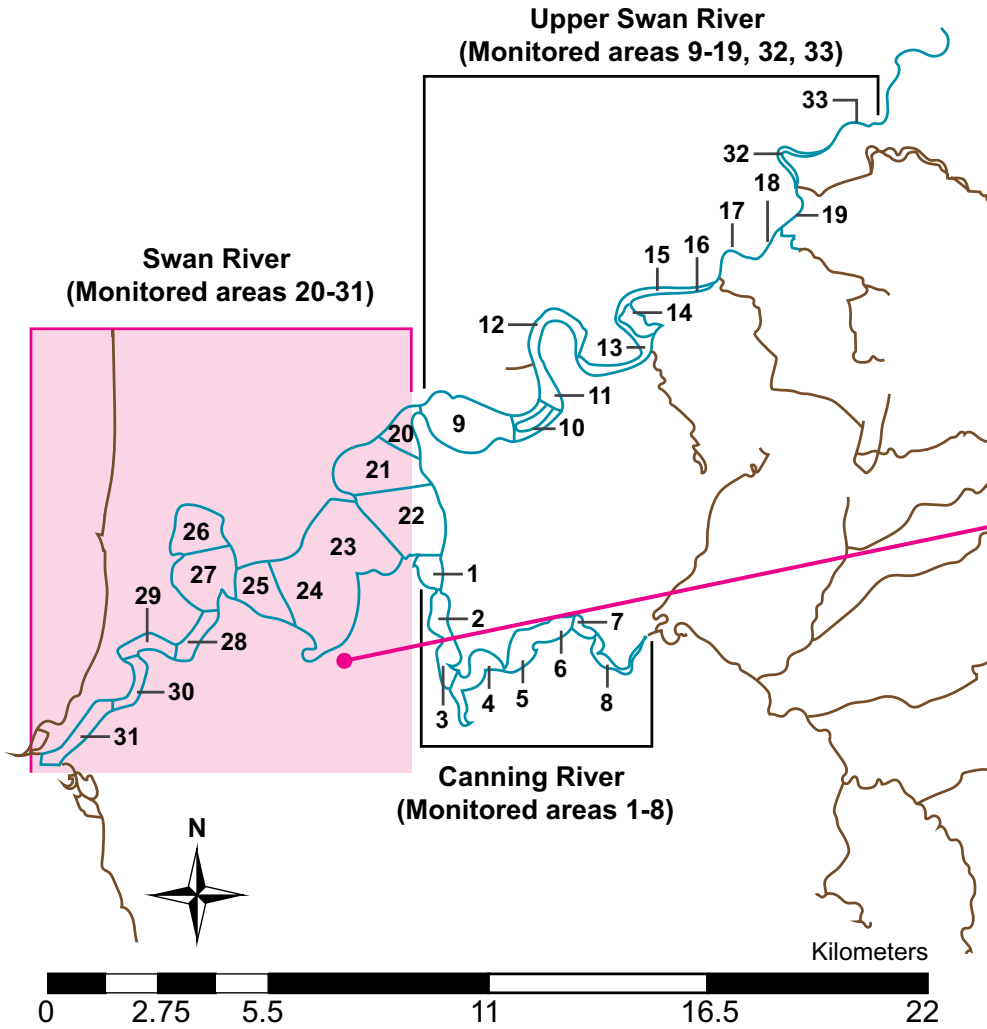
**Swan River (Monitored areas 20 - 31),
areas 20 - 28 of 31 shown below**

Monitored area 20

Monitored area 21

Monitored area 22

Monitored area 23

Monitored area 24

Monitored area 25

Monitored area 26

Monitored area 27

Monitored area 28

Number of sightings

Month
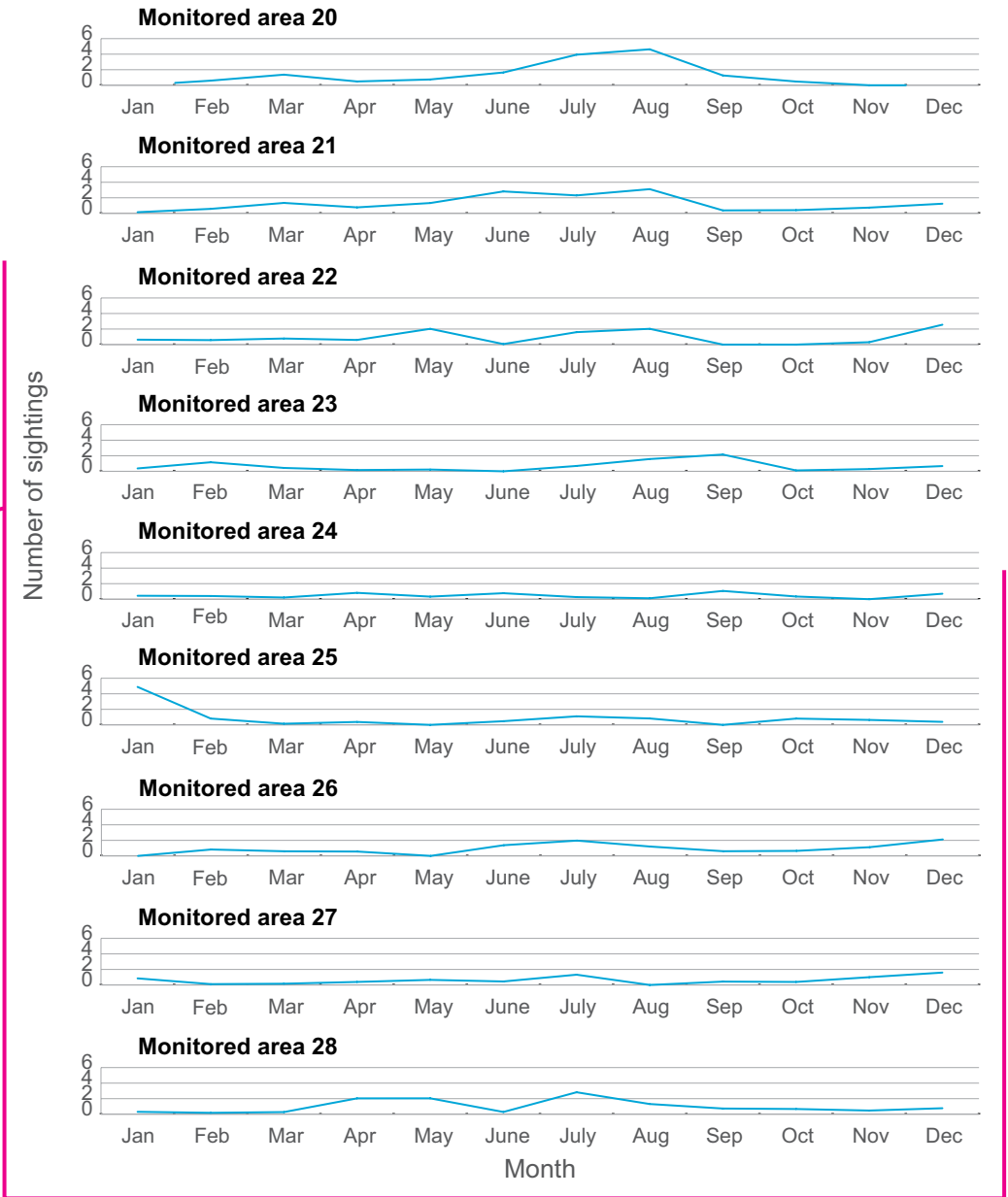
Figure 9c

**Total average dolphin sightings per hour
in Swan River (monitored areas 20-31)**

**Upper Swan River
(Monitored areas 9-19, 32, 33)**

**Swan River
(Monitored areas 20-31)**

33
32
18
17
19
15 16
14
12
13
11
20 9 10
21
22
26 23
27 25 24
29 28
30
31

1
2
7
6
4 5 8
3

**Canning River
(Monitored areas 1-8)**

N

Kilometers

0   2.75   5.5   11   16.5   22
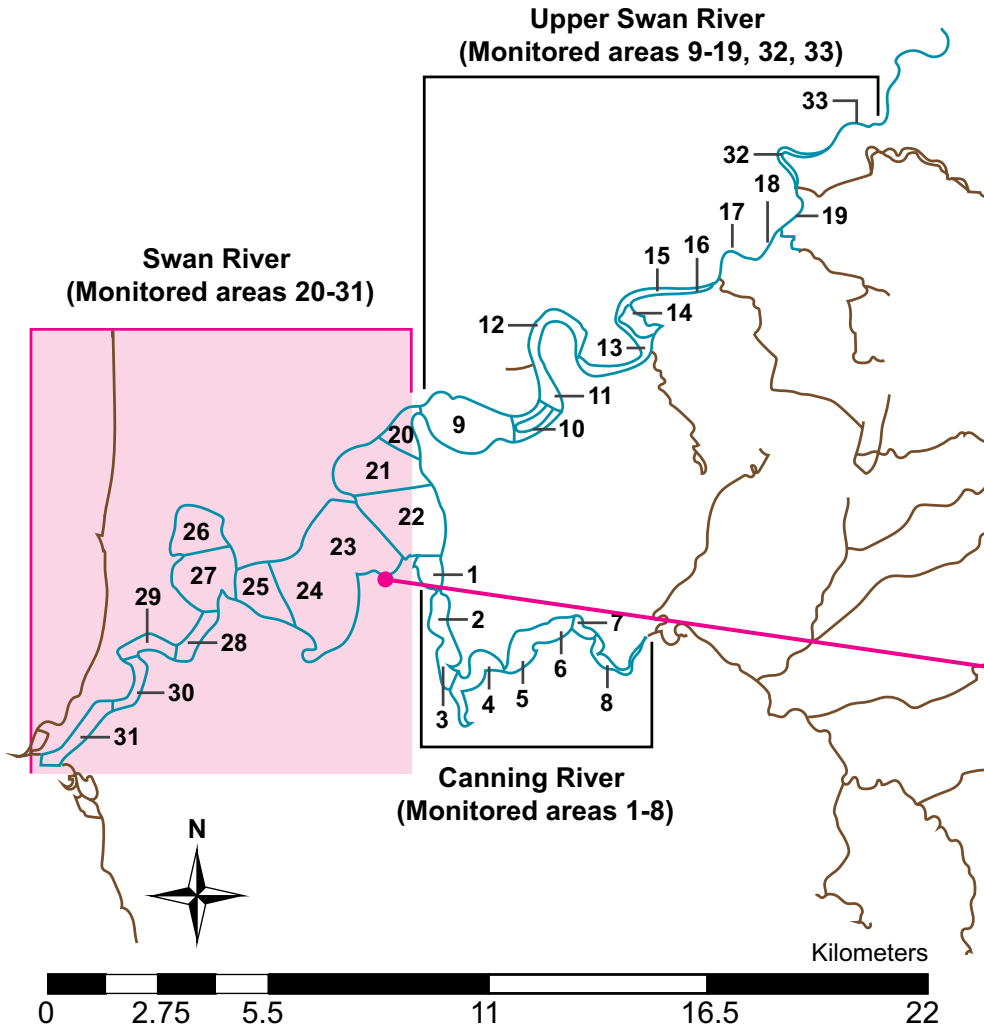
**Swan River continued (Monitored areas 28 - 31),
areas 29 - 31 shown below**

Monitored area 29

6
4
2
0

Jan Feb Mar Apr May June July Aug Sep Oct Nov Dec

Monitored area 30

6
4
2
0

Jan Feb Mar Apr May June July Aug Sep Oct Nov Dec

Monitored area 31

24
22
20
18
16
14
12
10
8
6
4
2
0

Jan Feb Mar Apr May June July Aug Sep Oct Nov Dec
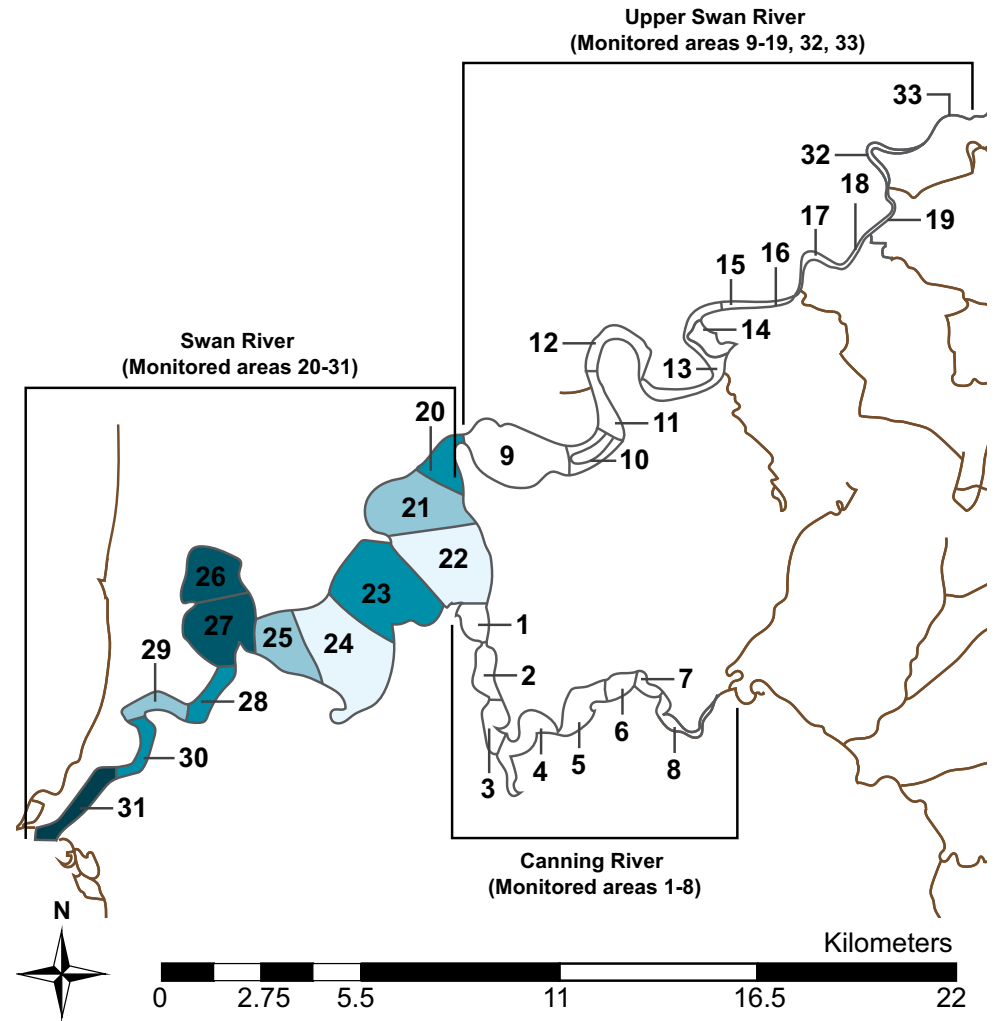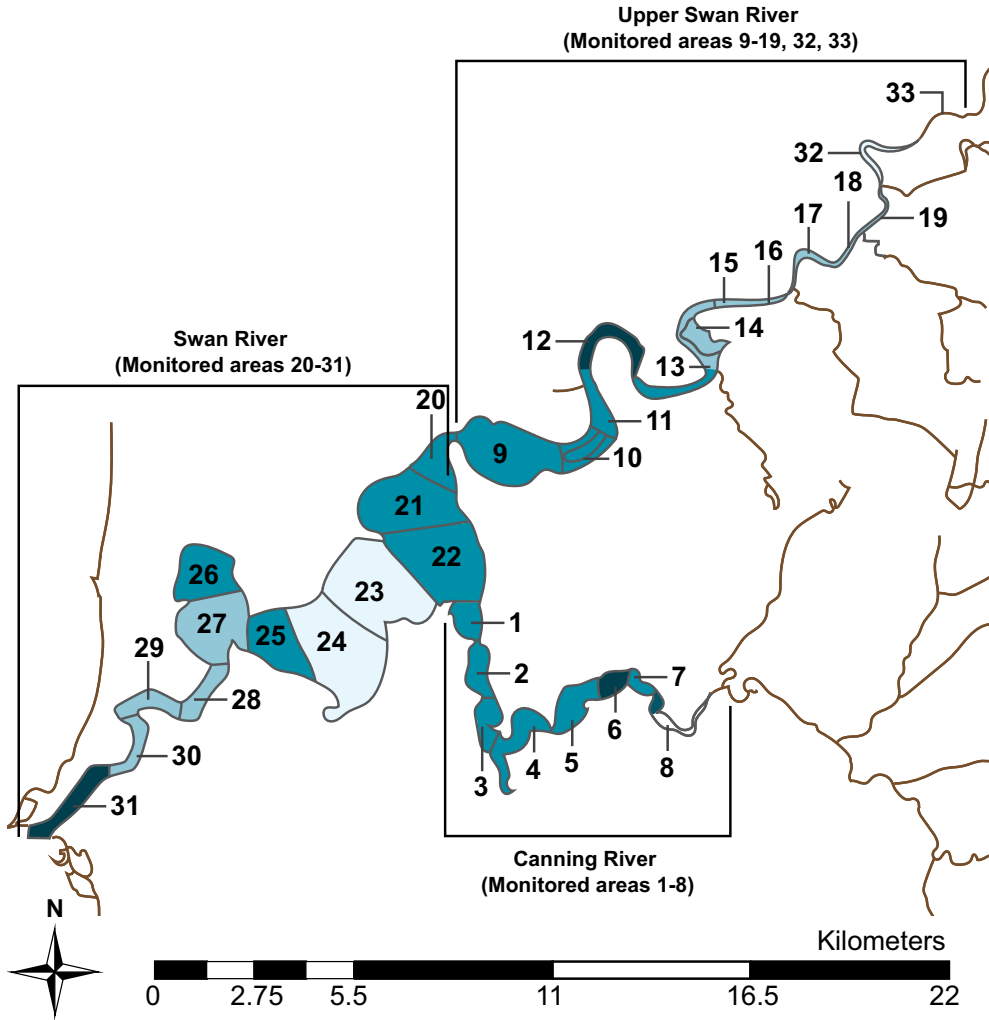
Month

Figure 9c continued

Figure 10. Relative dolphin sightings per unit effort (rescaled from 0 to 100) for (A) *Dolphin Watch* surveys between 2011 and 2013, (B) vessel surveys (conducted by Chabanne and Finn, Murdoch University) in 2013, and (C) *Dolphin Watch* surveys conducted in 2013 (2009 and 2010 were not included since not all effort was recorded. The year 2014 was also excluded here since the data set analysed only included up until mid-February).

(C) Dolphin Watch Sightings 2013

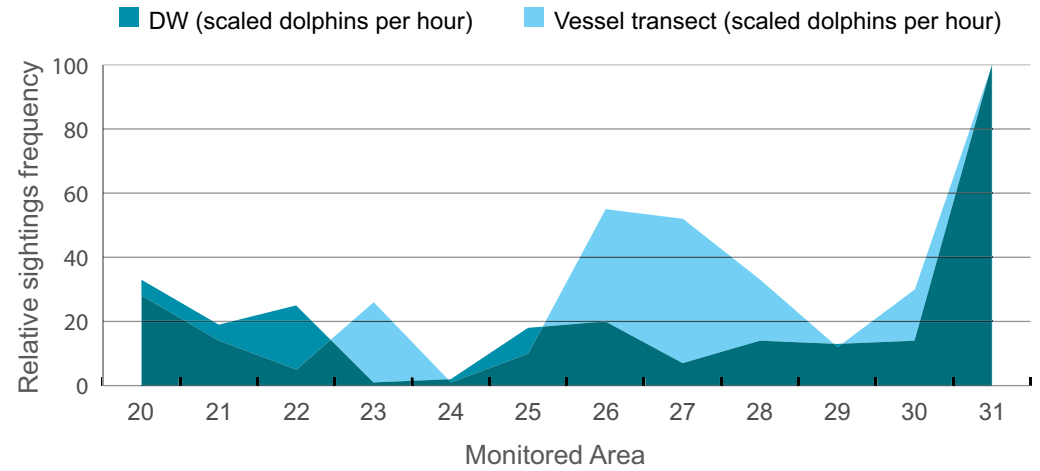**Relative dolphin sightings per unit effort**

Figure 11. Relative dolphin sightings per unit effort (rescaled from 0 to 100) for *Dolphin Watch* surveys (DW) in 2013, and vessel surveys conducted by Chabanne and Finn (in progress, Murdoch University) in 2013.

Update on boat-based surveys

Research findings 2013-2014
Survey effort
Researchers have been conducting boat-based surveys of dolphins in the Riverpark since June 2011. These surveys follow a systematic route running from the Inner Harbour of the Port of Fremantle upriver to the Causeway Bridge near the Perth CBD and to the entrance of the Canning River by the South of Perth Yacht Club.
Over the last three years, 100 surveys have been conducted including 18 surveys between June 2013 and March 2014 (Figure 12).

How many dolphins have been identified in the Swan Canning Riverpark?
Since June 2011, we have photo-identified 42 different dolphins within the Riverpark. This includes calves and dolphins who have died, such as Highhope who died in January 2013. The discovery curve below shows the rate at which dolphins have been identified over time (Figure 13). About 20 dolphins were identified in the first few months of surveying in 2011 and more than

35 dolphins within a year. We have continued to identify small numbers of new dolphins since then – these tend to be acquaintances of Riverpark dolphins who accompany their Riverpark friends for brief periods in the estuary or coastal females who are being herded by Riverpark males. Over the last year, we have identified two new dolphins in the Riverpark – a mother and calf pair.
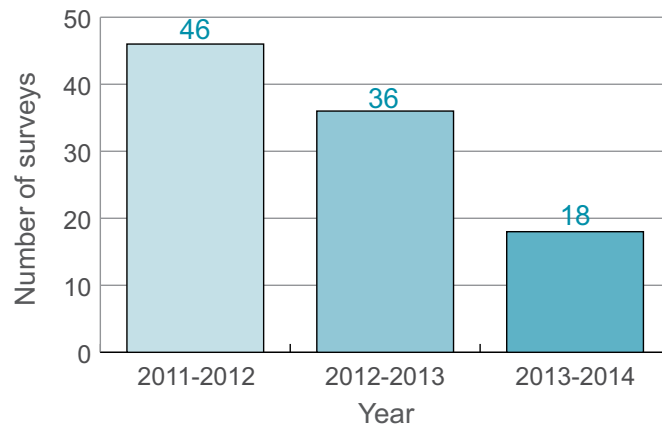
Number of surveys per year

Figure 12: Number of surveys per year – Year 1 (June 2011 - May 2012), Year 2 (June 2012 – May 2013), and Year 3 (June 2013 - March 2014).
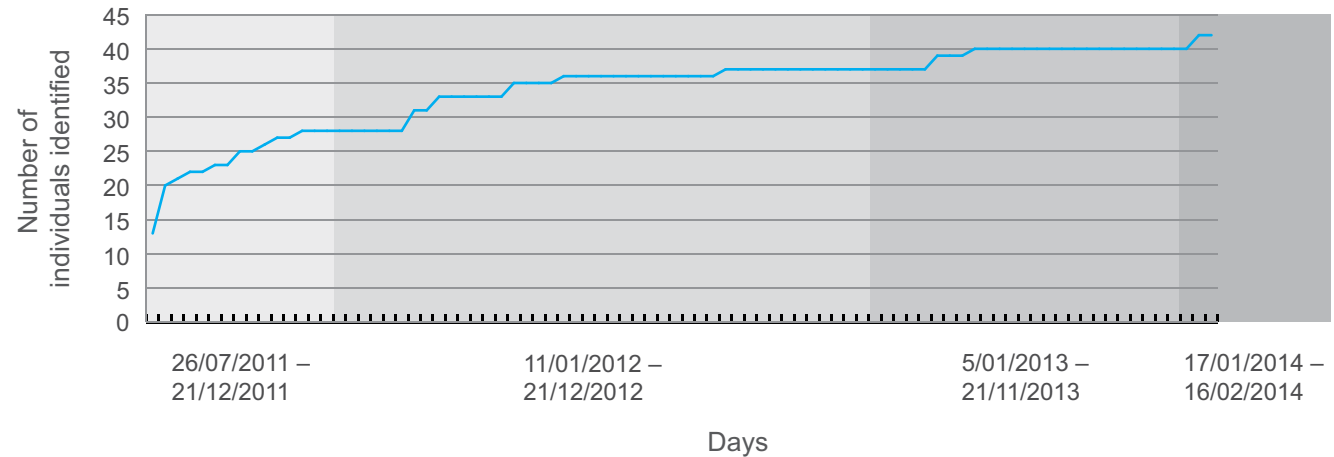
Number of surveys in which dolphins were observed

Figure 13: Discovery curve of individual dolphins observed within the Swan Canning Riverpark

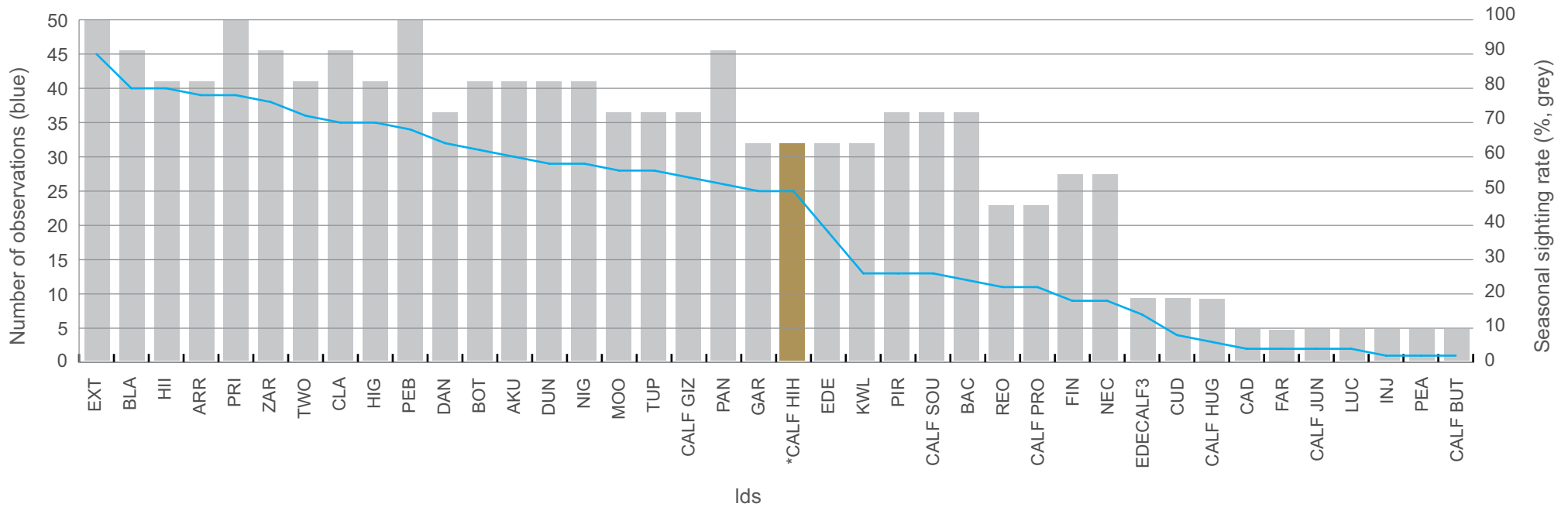**Number of surveys in which dolphins were observed**

Figure 14: Number of observations and Seasonal Sighting Rate (SSR) for each identified dolphin (including calves) over 3 years data. *CALF HIH died in January 2013. Based on 104 surveys between June 2011 – March 2014.

Twenty-eight dolphins have been sighted in at least 10 per cent of the total number of surveys since June 2011, including Highhope [HIH], who died in January 2013. We describe these dolphins as being frequently seen within the Riverpark. The Seasonal Sighting Rate (SSR) indicates whether or not dolphins are year-round within the estuary. Twenty-two dolphins – including four calves/juveniles (Zari, Night, Gizmo, and Soul) – have a SSR greater than 70 per cent using sightings from June 2011–March 2014. We consider these 22 dolphins to be resident year-round within the estuary.

Some dolphins were sighted in more than 10 per cent of surveys, but had SSRs of less than 70 per cent. While these dolphins frequently used the Riverpark, they were not seen in as many seasons as the 22 dolphins with high >70% SSRs. The Riverpark dolphins also range into the coastal waters adjacent to the Riverpark and some dolphins appear to spend more time along the coast than in the estuary than others. For example, Garden, Eden, Kwillena Lookalike, and Resource, and her calf Product, were also observed in the coastal waters. Further research will help us understand how dolphins vary in their use of the Riverpark and why certain dolphins occur only very occasionally in the Riverpark (i.e. in <10 per cent of surveys).

One insight that we have gained is that these occasional dolphins were all females, some with dependent calves and some without, and they were mainly observed with resident males in the portions of the Riverpark closest to the ocean. It appears that the Riverpark males bring coastal females into the estuary during consortships – this may allow them to avoid contact with other males who might try to capture the female.

Dolphin Watch Award Winners 2013/14

2014 Dolphin Watch Photographer Award

Awarded to the volunteer who contributed an outstanding dolphin photo.

Wayne Theobold pictured with Swan River Trust General Manager Rod Hughes

Wayne Theobold

Wayne worked in the tourism industry on the Swan River since 1991. While on the job, he developed an interest in what was happening in the Riverpark and he particularly enjoyed seeing and photographing the dolphins. When he heard about *Dolphin Watch*, Wayne organised a *Dolphin Watch* training session on board one of the local tour company vessels and he has been officially volunteering and educating passengers and crew members for more than three years.

2014 Dolphin Watcher Award

Awarded to the volunteer who contributed the most amount of monitoring time.

Joan Munro pictured with Minister for Environment; Heritage the Hon. Albert Jacob

Joan Munro

Joan and her husband are very interested in the environment and belong to a local community group undertaking various volunteer works around the river. Joan has been volunteering for the *Dolphin Watch* project for more than two years. Joan fits *Dolphin Watch* volunteering into her lifestyle easily as she lives close to the river and drives by it regularly. Joan and her husband Brian walk a lot and can see the river from their balcony.

2014 Citizen Scientist Award

Awarded to the volunteer who contributed excellent citizen scientist observations of dolphins and their surroundings.

Sue Harper pictured with *Dolphin Watch* patron Professor Lyn Beazley

Susan Harper

Susan first read a newspaper article about *Dolphin Watch* four years ago, and as someone who loves dolphins, was keen to hear about a way she could get involved. Living by the river, Susan is always on the lookout for dolphins whenever she walks and was excited to have an opportunity to contribute to research, and to learn more about the iconic bottlenose river dolphins. As a keen conservationist and amateur photographer, Susan enjoys volunteering her time for something she is passionate about.

Dolphin Watch Volunteer Profile

Trudy Klessens - Dolphin Watch Volunteer

Professor Lyn Beazley presenting Trudy with the 2013 Chief Scientist's Citizen Scientist of the Year award.

I joined *Dolphin Watch* a few years ago after noticing an advertisement in the local community newspaper. Knowing that I could be helping out with scientific research while walking by the river sounded great to me and I'd been looking for another volunteering opportunity. My husband and I attended the very informative training session at the Perth Zoo.

The *Dolphin Watch* excursion days and workshops offering further training were fantastic days out and a great chance to get to know other Dolphin Watchers while spending some time learning about dolphins, our rivers and what we can do to help keep our river systems healthy. The enthusiastic team at the Swan River Trust, who have welcomed us with open arms, are always helpful with our questions on dolphin behavior and river health and they put in an enormous amount of work to keep the *Dolphin Watch* project running.

I thoroughly enjoy wandering along the river, watching out for dolphins. Each time I see a dolphin in the wild, it is an amazing, exhilarating experience that I never grow tired of seeing. Being able to see these beautiful creatures so close is breathtaking. Sometimes I may not see any, I might see just one or two and other occasions I've seen up to eight at a time, often working together to round up fish to catch a feed.

It can be quite comical at times to observe the local birds like pelicans and seagulls in competition with the dolphins trying to catch the fish as the dolphins round them up. You can see how the dolphins end up with some of the marks and scars on their bodies as the birds come precariously close and seem to collide with the dolphins at times desperately trying to grab an easy feed before the dolphins.

I will often grab my camera and have been known to run along the shore trying to get ahead of the dolphins to get a good photo (they are rather elusive and can be hard to photograph, you need to almost predict where they will surface next to get the shot). Often members of the public are quite helpful once they see me with the camera, calling out as to which way the dolphins are heading, especially if there are a few dolphins and they split up, sometimes they do swim quite close to shore and this is the best time to photograph them with enough detail to identify them. It's wonderful to see how much people love dolphins, most people will stop what they are doing and watch, often hoping the dolphins might put on a bit of a show, leaping out of the water. Sometimes they are lucky.

On one occasion we were standing on the shore and spotted three dolphins heading our way, we stayed where we were only to have them almost beach themselves on the shore right in front of us, they were turning on their side, almost staring at us with that distinct expression like they were smiling. They stayed there for some time, checking us out, making us wonder who was the entertainment, them or us. A truly surreal experience we will never forget.

It was an absolute honor to be awarded the 2013 Chief Scientist's Citizen Scientist of the Year award. The *River Guardians* team along with scientists from Murdoch and Curtin universities are very dedicated and their enthusiasm does rub off. I look forward to continuing my dolphin watching and assisting in the study of these beautiful creatures.

Project partners

Supported by

Swan River Trust

Level 1 Fortescue Centre 20 Terrace Road East Perth Western Australia

PO Box 6829 East Perth Western Australia 6892

Telephone (08) 9278 0900 Facsimile (08) 9325 7149

info@swanrivertrust.wa.gov.au

www.swanrivertrust.wa.gov.au