WESTERN AUSTRALIAN
MARINE SCIENCE
INSTITUTION

WESTPORT

Better science **Better decisions**

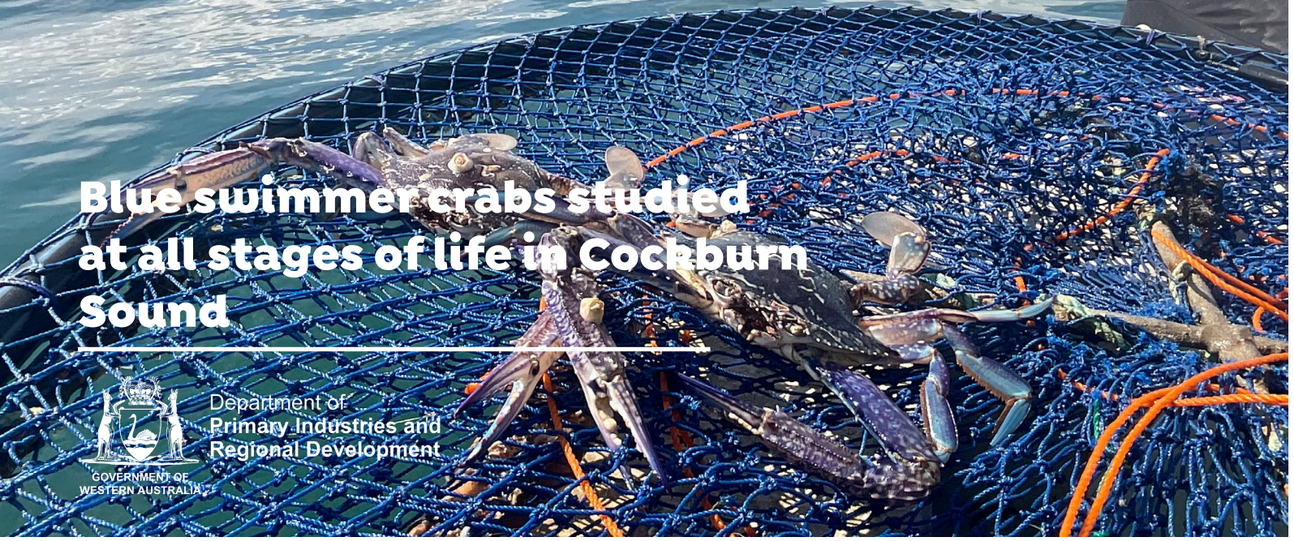
RESEARCH *Highlights*

FEBRUARY 2024

WESTERN AUSTRALIAN
MARINE SCIENCE
INSTITUTION

Western Australian Marine Science Institution (WAMSI)
Indian Ocean Marine Research Centre
64 Fairway, Entrance 4, Crawley WA 6009
(61 8) 6488 4570
info@wamsi.org.au

www.wamsi.org.au



Blue swimmer crabs studied at all stages of life in Cockburn Sound

Department of Primary Industries and Regional Development

GOVERNMENT OF WESTERN AUSTRALIA

A research team has, for the first time, been able to build a comprehensive picture of the distribution and abundance of blue swimmer crabs in Cockburn Sound over the species' entire life cycle.

Dr Danielle Johnston, a senior research scientist from the Department of Primary Industries and Regional Development, is leading the collaborative project as part of the WAMSI Westport Marine Science Program.

She said blue swimmer crabs (*Portunus armatus*) were once the Sound's biggest commercial fishery but stocks declined in the early 2000s with fishery closures in 2006 and 2014.

While DPIRD researchers have been surveying juvenile and adult blue swimmer crabs in the area for more than 20 years as part of fishery monitoring programs, they hadn't had the opportunity to survey larvae.

"The juvenile and breeding stock data we have collected over the two years of the WAMSI Westport Marine Science Program builds on the historical data we already have but the collection of crab larvae is something we haven't been able to achieve before," Dr Johnston said.

"Collection, identification and counting crab larvae requires highly specialised skills and we were very fortunate to collaborate with scientists at the Western Australian Museum to achieve this.

"This has meant we have a couple of years of data on crab larvae, juveniles and adult breeding stock which gives us a much better understanding of the whole life cycle of the blue swimmer crabs."

Researchers are investigating the spatio-temporal distribution, or where and at what times of the year, the short-lived crustaceans are most abundant and whether observed trends can be explained by relationships with environmental conditions and habitat. These findings can then be used to inform the Westport program.

The research team has caught about 8,500 adult blue swimmer crabs and around 1,500 juveniles over the areas of Cockburn Sound and Owen Anchorage which were measured before being returned to the water.

Collecting data on each life history stage has meant using multiple sampling methods.

"We're looking at all life stages so we used bongo nets and light traps to collect crab larvae, trawl nets to collect juvenile recruits and hourglass traps for adult crabs and breeding stock."

"Juvenile and adult crabs bury themselves in the sediment during the day and emerge for feeding at night, so much of our sampling occurred at night when the blue swimmer crabs are most active".

Sampling for this project has now finished and the next stage will be to complete a comprehensive analysis, interpretation and write-up of the data.

But Dr Johnston said preliminary results show abundance was higher in the first year of the sampling in 2021-22.

"Crab abundances will differ from year to year based around environmental conditions, with warmer temperatures generally resulting in higher abundance as blue swimmer crabs are a tropical species," Dr Johnston said.

Refer to the DPIRD website for the latest information on fishing regulations for blue swimmer crabs: http://rules.fish.wa.gov.au/Species/Index/27

Volunteers spring into action to help seagrass recovery in Cockburn Sound

THE UNIVERSITY OF WESTERN AUSTRALIA

A seagrass restoration program, that is helping to regenerate Cockburn Sound's underwater meadows, has had a record number of volunteers helping to spread hundreds of thousands of seeds from the plants.

About 80 per cent of Cockburn Sound's meadows were wiped out in the 1950s and 60s because of poor water quality. Seeds for Snapper harnesses community help, backed by scientific knowledge, to collect seeds and disperse them where they are most needed.

Research officer Rachel Austin, from The University of Western Australia's School of Biological Sciences, who helps run Seeds for Snapper with fishing conservation charity OzFish, said volunteers helped disperse 670,000 seeds over 10 sites during November.

"It's very simple, very scalable and results in much higher seeding density than what happens naturally," Ms Austin said.

"We estimate that more than 90 percent of seagrass fruit ends up where it cannot grow, including on the beach and in deep water.

"We are able to collect the seeds and throw them into specially chosen areas where they are more likely to take hold."

Volunteer Seeds for Snapper divers collect seagrass fruit in nets and other groups on shore work at tanks to sort husks from the seeds. Recreational boaters then take the seeds into Cockburn Sound to throw them back in the water at selected sites.

"By doing what we are doing we can get substantially more seedlings in an area compared to what can happen naturally. "

She said the program had not only had a practical benefit in helping regenerate parts of the seabed but had also increased awareness of the importance of seagrass for storing carbon, stabilising the seabed and providing breeding areas and habitat for marine animals.

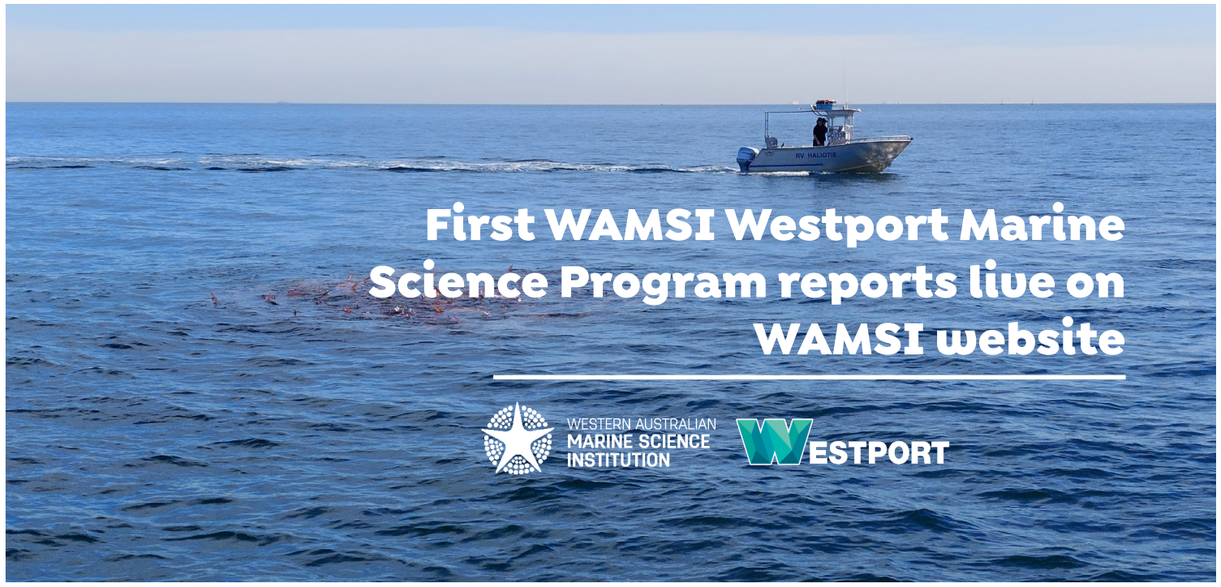
"If you want squid, fish and octopus you've got to have somewhere for them to live and that is your seagrass meadows," Ms Austin said.

"Public awareness around the importance of seagrass has really grown and the fishers we speak to are really enthusiastic," Ms Austin said.

"About 200 hectares has regrown but we're still missing 2,000 hectares."

Seagrass restoration is among the research projects currently underway as part of the WAMSI Westport Marine Science Program. OzFish Western Australia Program Manager, Steve Pursell, said 2023 was the second biggest year for Seeds for Snapper in terms of the number of seeds released into Cockburn Sound. Last year was the highest since it started six years ago.

"The program has really gained momentum," Mr Pursell said.



First WAMSI Westport Marine Science Program reports live on WAMSI website

WESTERN AUSTRALIAN MARINE SCIENCE INSTITUTION

WESTPORT

The first of the delivered research reports have been published as part of the WAMSI Westport Marine Science Program. The first four reports from Themes 2, 3 and 8 are live on the WAMSI website and include the following:

Kendrick, G., Austin, R., Ferretto, G., van Keulen, M., Verduin, J., (2023). Stage 1: Review of past seagrass restoration projects and guidelines for restoration in Cockburn Sound. Prepared for the WAMSI Westport Marine Science Program. Western Australian Marine Science Institution, Perth, Western Australia. 78 pp.

Bekele, E., Donn, M., Davis, G., Rayner, J., Furness, A.(2023) Review of surface water drains and likely mass fluxes to Cockburn Sound. Prepared for the WAMSI Westport Marine Science Program. Western Australian Marine Science Institution, Perth, Western Australia. 78 pp.

Cannell, B. (2023). Options to mitigate potential starvation of penguins during the Westport dredging campaign - review and recommendations. Prepared for the WAMSI Westport Marine Science Program. Western Australian Marine Science Institution, Perth, Western Australia. 12 pp.

Chabanne, D. (2023). Broad-scale distribution and habitat mod-elling of Indo-Pacific bottlenose dolphins (Tursiops aduncus) in Owen Anchorage and Cockburn Sound using boat-based survey data from 2011-2015. Prepared for the WAMSI Westport Marine Science Program. Western Australian Marine Science Institution, Perth, Western Australia. 64 pp.

To access all the reports as they are finalised, please visit the 'Research Themes and Reports' on WAMSI's Cockburn Sound Page at: **https://wamsi.org.au/research/programs/wamsi-westport-marine-science-program/**

Recreational fishers have their say in boat ramp and beach surveys

Department of Primary Industries and Regional Development

GOVERNMENT OF WESTERN AUSTRALIA

Healthy snapper stocks and seagrass restoration were among the top priorities for recreational fishers who were surveyed this year as part of a social impact project for the WAMSI Westport Marine Science Program.

Dr Matthew Navarro, from The University of Western Australia's School of Biological Sciences, said members of the research team spoke to fishers at boat ramps and on beaches within Cockburn Sound about a range of topics.

These included what attracted them to the area, their thoughts on a container port and what opportunities there were to enhance recreational fishing in the area.

Seagrass restoration was the most preferred way of enhancing fishing, followed by new artificial reefs and re-stocking.

"It shows fishers really care about the marine environment beyond what they can catch, and they have an appreciation of the habitat of these fish." Dr Navarro said. "Cockburn Sound is close to a lot of people so it's convenient, but it's also sheltered so it provides people with a safe place to go fishing."

The fishers were surveyed about whether they were concerned about an impact on their fishing experience from a container port.

"There was a large amount of uncertainty in the fishing community about the container port and a wide range of views about its potential impacts on fishing experiences. "

"We asked the surveyed fishers their reasons for concern and almost half (46 percent) said it was because of impacts on their catch, with most fishers mentioning impacts on snapper specifically" Dr Navarro said.

"They were also concerned about impacts on seagrass and its flow-on effects"

Dr Navarro said the surveys provided an important opportunity to talk to fishers in Cockburn Sound and understand their views on the proposed contained port. "It is a good opportunity to have frank conversations and by conducting surveys on the ground with fishers in Cockburn Sound you are guaranteed to be talking to the people affected most."

Project findings will be used by Westport to ensure future seagrass restoration is designed and implemented with the best chance of success.

The community will be able to learn more about potential impacts and mitigations activities, and provide feedback, during Westport's Environmental Impact Assessment process. Visit the Westport website for more information.

The final WWMSP reports will be published on the WAMSI website (Cockburn Sound program page).

Volunteer beach walkers help with penguin surveys

THE UNIVERSITY OF WESTERN AUSTRALIA | OCEANS INSTITUTE

Volunteers surveying Cockburn Sound for deceased or injured little penguins have completed more than 700 beach surveys since the initiative started.

Little penguins are being studied as part of the WAMSI Westport Marine Science Program and volunteer beach walkers have come from the community and employees of one of the industries operating near the foreshore.

Project lead Dr Belinda Cannell, from The University of Western Australia's School of Biological Sciences, said the eastern foreshore was divided into one kilometre stretches which each volunteer committed to walking along once a week.

Any dead penguins found were taken to the Department of Primary Industries and Regional Development for necropsy.

"A total of 758 surveys have been done between February 2021 and July 2023," Dr Cannell said.

"Not all beaches were consistently surveyed and we do plan to continue the surveys until February 2024."

She said although no dead penguins had been found by volunteers during the surveys, several penguins had been discovered by other people showing injuries consistent with being hit by boats.

One injured dead penguin was discovered floating in the water in Cockburn Sound, and an injured live penguin was found on a beach in Madora, further south.

> **"These particular penguins were not found as part of the surveys but highlight the very real threat of boat injuries to little penguins."**

"The surviving penguin had a cut on its leg and a large cut to its abdomen," Dr Cannell said.

Some emaciated penguins were also found on the foreshore of Cockburn Sound in late 2023.

The Western Australian Government, through Westport, funded the research to improve understanding of the diet, causes of mortality, foraging habitat and home range of little penguins using Cockburn Sound.

The project findings will be used by Westport for the design, construction and operation of the port.

A link to the program's reviews and reports on apex predators and iconic species can be found on the WAMSI website here.

Old records shed light on Cockburn Sound's Syngnathids

Detailed, handwritten records from almost 30 years ago have played a crucial role in what's believed to be the most comprehensive study of seahorses, pipefishes and seadragons in Cockburn Sound and Owen Anchorage.

The project is looking at the distribution of syngnathid fishes – a family of fishes that includes many of the iconic species. Data have come from historical records, museum archives, field research and contributions from citizen scientists.

Dr Glenn Moore from the Western Australian Museum is the leader of the project, which is part of the WAMSI Westport Marine Science Program. He said records from 1997 and 1998 were from a PhD project by Dr Alan Kendrick (now at WAMSI) which was supervised by Professor Glenn Hyndes (Edith Cowan University.)

"These notes have been absolutely critical," Dr Moore said.

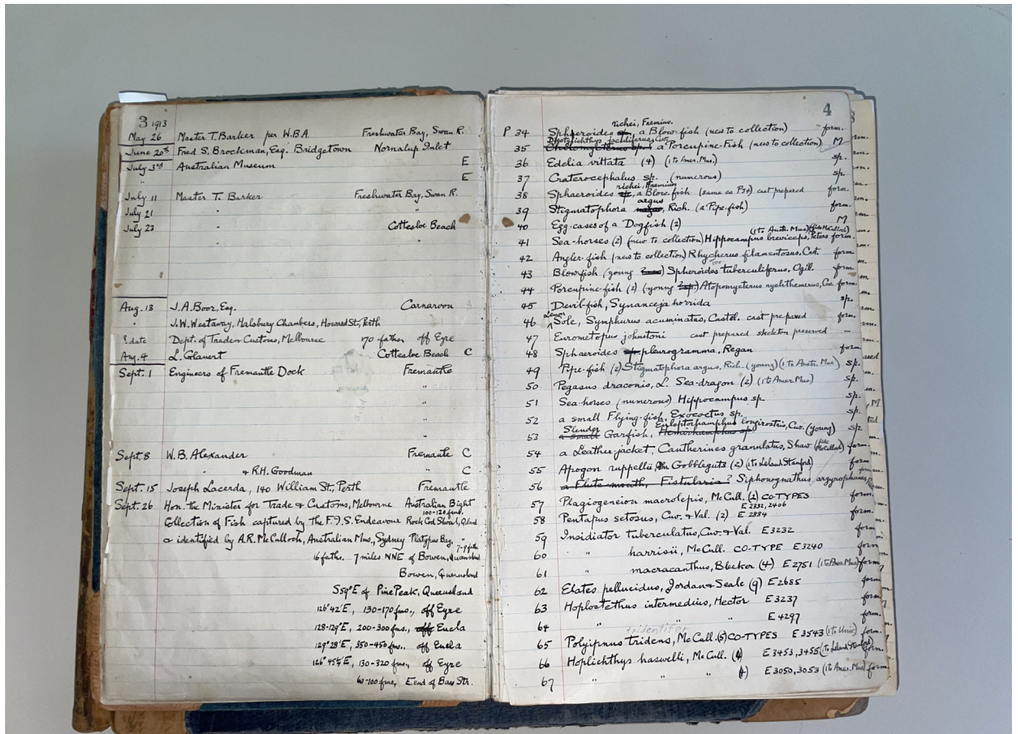
"There are records of what species were found in Cockburn Sound and Owen Anchorage and their coordinates."

"It is by far the most comprehensive data set available for syngnathids in Western Australia and possibly most of Australia."

The field notes, and comments and methodology, have since been transcribed and digitised by Dr Moore's colleague, WA Museum technical officer (fishes), Jenelle Ritchie.

"It is good that we have been able to digitise those data now, almost three decades after they were collected, and I have no doubt it will help other researchers in the future," Dr Moore said.

"It is a huge data set and more than two thirds of the data for this project has come from that research."



Citizen scientist divers spot array of pipefish and seahorses

Curious citizen scientists, diving in Cockburn Sound and Owen Anchorage, have recorded 12 species of syngnathids - a family of fishes that includes the state's own iconic West Australian Seahorse.

Divers have been uploading their observations, some dating back to 2006, to help map the distributions of the 21 species known to occur in the area. Nearly two thirds of all observations, carried out as part of a WAMSI Westport Marine Science Program (WWMSP) project, were of the West Australian Seahorse.Tiger Pipefishes were the most commonly spotted species of pipefish, which have elongated bodies and camouflage well in seagrass. They accounted for 10 percent of observations.

Dr Glenn Moore from the Western Australian Museum, who leads the research project, said multiple methods were used to map the distribution of the iconic fishes in an area spanning just south of Fremantle to the southern part of Cockburn Sound.

"This is a multi-method approach essentially trying to map out which areas they are using. It's involved citizen scientists, old records and data gathered from researchers working on WWMSP fisheries projects," Dr Moore said.

"Overall, in that area we had 679 observations of syngnathids by citizen scientists," The citizen science project was established on iNaturalist and had 91 observers contributing to it.

"For the project, we are also gathering data on breeding, the diet of the various syngnathid species and information on where they fit into the food web."Dr Moore said the largest diversity of species were in areas where there was seagrass. "They do like the seagrass meadows, particularly pipefish."

"The trawls work well in the seagrass, so by nature of sampling we are biased towards seagrass areas however we did also find syngnathids in reef areas." He said West Australian Seahorses tended to be abundant in the areas where divers went, such as on reefs and around jetties, and the species was easier to see underwater than some other syngnathids.

Other common species of syngnathids in Cockburn Sound and Owen Anchorage are the Knobby Seahorse, Rhino Pipefish, Pugnose Pipefish, Spotted pipefish and Widebody Pipefish. The Hairy Pipefish and Mother-of-pearl Pipefish are considered rare.

Dr Moore said understanding the distribution of syngnathids could help with decision making around activities such as the timing and location of dredging and construction work.

He said it was helpful to have so many citizen scientists supporting the project and contributing photos and location data. "While syngnathids are really just fish, people are particularly intrigued by them and they really draw them in. Finding cryptic syngnathids is a challenge for many people."

"We have had many committed divers who have spent a lot of time looking for them and their contribution to the project is invaluable."

ACKNOWLEDGEMENT AND ARTICLE CONTRIBUTION

BLUE SWIMMER CRAB STUDIED AT ALL STAGES OF LIFE IN COCKBURN SOUND (Page 1 & 2)
Spatial distribution and temporal variability in life stages of key fish species in Cockburn Sound.
Project Leader: Dr Danielle Johnston (DPIRD).

VOLUNTEERS SPRING INTO ACTION TO HELP SEAGRASS RECOVERY IN COCKBURN SOUND (Page 3)
Seagrass restoration program.
Project Leaders: Professor Gary Kendrick (UWA) and Professor Jennifer Verduin (MU).

FIRST OF WAMSI WESTPORT MARINE SCIENCE PROGRAM REPORTS LIVE ON WAMSI WEBSITE (Page 4)
WAMSI Westport Marine Science Program (WWMSP).
Program Leader: Dr Alan Kendrick (WAMSI).

RECREATIONAL FISHERS HAVE THEIR SAY IN BOAT RAMP AND BEACH SURVEYS (Page 5)
Opportunities and impacts for recreational fishing from the Westport development.
Project Leader: Dr Matthew Navarro (UWA).

VOLUNTEER BEACH WALKERS HELP WITH PENGUIN SURVEYS (Page 6)
Determining the diet, causes of mortality, foraging habitat and home range of Little Penguins using Cockburn Sound.
Project Leader: Dr Belinda Cannell (UWA).

OLD RECORDS SHED LIGHT ON COCKBURN SOUND'S SYNGNATHIDS (Page 7)
Spatio-temporal distribution of syngnathids in Cockburn Sound.
Project Leader: Dr Glenn Moore (WAM).

CITIZEN SCIENTIST DIVERS SPOT ARRAY OF PIPEFISH AND SEAHORSES (Page 8)
Spatio-temporal distribution of syngnathids in Cockburn Sound.

Authorship: Cecile O'Connor
Publication Graphic Design and Communication: Dr Josh Bonesso
WAMSI Media contact: cecile.oconnor@wamsi.org.au

Photo credits: Josh Bonesso, Department of Primary Industries and Regional Development, Rachel Austin, Delphine Chabanne, Belinda Cannell, Henry Carrick, Jenelle Ritchie, Murdoch University.

WAMSI PARTNERS

Government of **Western Australia**
Department of **Water and Environmental Regulation**

Murdoch University

ChemCentre
EXPERT SOLUTIONS

Department of
Primary Industries and Regional Development
GOVERNMENT OF WESTERN AUSTRALIA

Curtin University

WAM Western Australian Museum

Department of **Biodiversity, Conservation and Attractions**
GOVERNMENT OF WESTERN AUSTRALIA

ECU Australia Edith Cowan University

The University of Western Australia

Australian Government

Australian Institute of Marine Science

WAMSI is funded by

Government of **Western Australia**
Department of **Jobs, Tourism, Science and Innovation**