

South West Marine Research Program



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South West Marine Research Program

The South West Marine Research Program (SWMRP) is entering its sixth year! Initially founded on a partnership between the Bunbury Dolphin Discovery Centre and Murdoch University, the SWMRP now includes partners from industry, government, research and the community. The initiative strives to assess the long-term viability of Bunbury's dolphin population. The program is providing important information for assessing the potential impacts of human activity on dolphins and for assisting industry partners in planning their activities in the marine environment while minimising their impacts on the local population.

An important aspect of the SWMRP is to communicate project outcomes to partners and the general public. To this end, we have launched a website and public engagement strategy to communicate and share scientific research that is accessible and exciting. The website profiles our areas of expertise, partners, research projects and publications. Social media, a key component of the website, offers a transparent view of research projects 'from the field' and all of the latest news from the lab. The platform shares exciting advances of the research initiatives. Since its launch (July 2011), the website has had >46,000 page views from 140 different countries. We also showcase the SWMRP via Facebook where >930 people follow the research activities on a weekly basis.

Current research updates:

SWMRP students are researching several aspects of dolphin biology and ecology:

- **Dr. Holly Smith:** We are delighted to inform you that Holly has been awarded her doctorate degree, as the first student to do so under the SWMRP initiative. Her PhD thesis is entitled: *POPULATION DYNAMICS AND HABITAT USE OF BOTTLENOSE DOLPHINS, BUNBURY, WESTERN AUSTRALIA*. Holly's work is providing important information on the local dolphin population for future sustainable development of the Bunbury harbour.
- **Kate Sprogis, PhD candidate:** Kate's research picks up where Holly's left off. Her study focuses on predictive habitat modelling and abundance and distribution of bottlenose dolphins. Kate conducts year-round dolphin surveys from Busselton to Binningup (520km² study site).
- **Shannon McCluskey, PhD candidate:** Shannon's research focuses on dolphin foraging ecology (see next newsletter).
- **Claire Daniel, PhD candidate:** This newsletter provides an update on Claire's research on the genetic mixing between dolphin populations along the SW, WA coast.



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Dolphin population genetics

Claire Daniel (PhD student at University of New South Wales, UNSW) is supervised by William Sherwin (UNSW), Lars Bejder (Murdoch University) and Michael Krützen (University of Zurich).

The main focus of Claire's project is to use genetic data to estimate dispersal (mixing) between bottlenose dolphin populations along the WA coast, from Perth to Esperance. These

measures of population structure will be used in a population model to predict how the Bunbury population and their neighbours will respond to potential threats in the future. For example, if populations show a high degree of mixing, seemingly distant threats, such as a point source of pollution, may have far-reaching consequences. On the other hand if a population is never replenished by immigrants, then inbreeding or an epidemic might have an unexpectedly severe effect on numbers.



Figure 1. Southwest sampling locations (number of samples collected in brackets).

Project methods

How do we measure dispersal of dolphins? Studies of dispersal based on non-genetic methods such as matching dorsal fin photos between locations require a huge regular effort at all locations, and still may miss any dispersing individuals. Genetic sampling, on the other hand, requires only a single sample. Genetic similarities and differences can be used to answer questions such as “how often do dolphins move between any pair of locations?”; “do males and females have different mobility between localities?”; and even “is this individual dolphin an immigrant?”.

In order to carry out genetic studies, we have to get DNA samples. For this, we need to get a piece of dolphin tissue. We do this by taking a small biopsy sample collected via a dart.

A dart is aimed at the dolphin's back, near the dorsal fin, where there is deep blubber but few nerves and blood vessels. The dart bounces off with a small skin sample, about 5mm diameter. We do not dart young calves, and only dart each individual once. Darted animals show their normal range of behaviour.



Figure 2. DNA!!! A skin sample in the end of a dart.

July 2012

Genetic lab work

Back in the lab, DNA is extracted from the tissue samples then we amplify maternally inherited DNA genes and fingerprint DNA genes. These analyses are also used in human parentage, relatedness, and identification analyses. DNA is also used to confirm the animal's sex.

Genetic findings

So far, we have worked mostly on maternally inherited DNA, which is called 'mitochondrial DNA). 100 individuals have been sequenced, showing 24 different genetic types in seven sampling locations, from Perth to Augusta.

Six of these genetic types are shared between all the seven areas, one in particular appearing in high frequencies over distances of 300km. Statistical analysis suggests that on average, at least one female moves between localities each dolphin-generation.

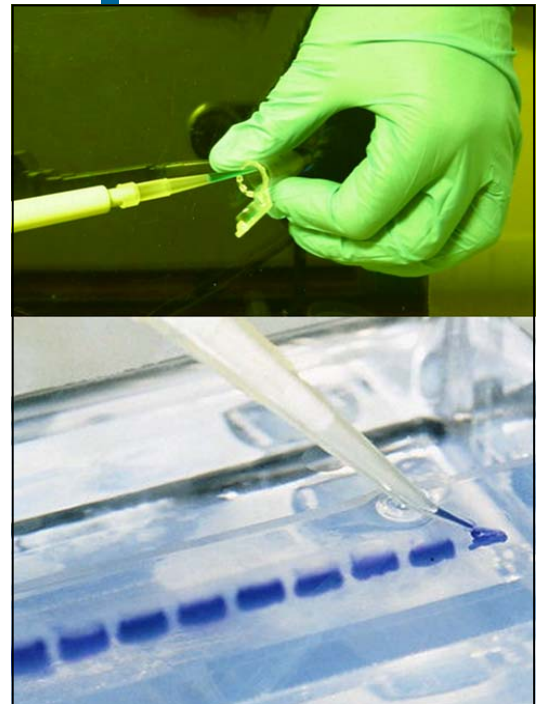


Figure 3. The pointy end of labwork. Pipetting DNA.

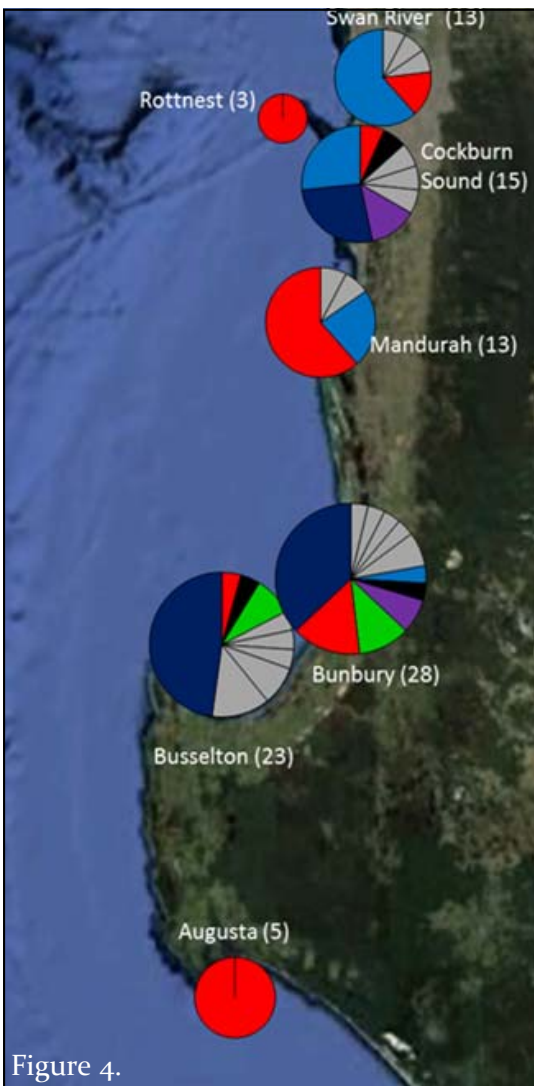


Figure 4.

In 2011-12, a further 90 samples have been collected in Perth, Cockburn, Bunbury and Augusta, and these will be added to the analysis along with samples from populations in Albany and Esperance, to build a more complete picture of the dolphin population dynamics in the South West. After this, we will analyse the DNA and estimate movement of both sexes.

The ultimate aim is to use the dispersal estimates in a population viability model of the greater SW-WA dolphin population, and use this model to predict the effect of potential threats to the population in the future.



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Figure 4. Map indicating proportions of shared (coloured) and unique (grey) haplotypes in SW sampling locations. The size of the pie chart in each location is proportional to sample size, also indicated in brackets. One haplotype in particular (indicated in red) is present in every sampling location, and several others are also widespread throughout the SW.

Marine Mammal Health Project:

The research into the Bunbury dolphin and whale mortalities and their post-mortem investigations is led by veterinarians Dr. Nahiid Stephens and Dr. Carly Holyoake based by Murdoch University. In 2011/2012, we recovered five dead dolphins and one beaked whale.

On the 13th June and 21 August 2011 two bottlenose dolphin individuals (both male sub adults) were found dead at Maiden's Reserve and Leschenault Estuary, respectively. These individuals were significantly decomposed, hampering post-mortem examination. Determining definitive cause of death was therefore impossible; the only significant post-mortem findings being a mild parasite related pneumonia in the first dolphin, and a mild putative peritonitis of unknown cause and significance in the second dolphin.

On the 28th September, "Boomer" a well-known female with a dependent calf, was observed with a large shark bite (see picture). Ten days later, Boomer was sighted again actively tossing octopus into the air. Nine days later Boomer was found dead in Koombana Bay and the calf has not been resighted.

On the 14th June 2012, "Fold" an adult male dolphin, died as a result of severe blunt force trauma to the chest, resulting in pulmonary haemorrhage (bleeding from the lungs) and haemothorax (blood in the chest cavity), as well as haemopericardium (bleeding into the pericardial sac that surrounds the heart) causing cardiac tamponade (blood in the pericardium). The cause of the trauma is unknown; a blunt vessel strike is possible; however, dolphins elsewhere in the world have been known to ram each other whilst fighting, a behaviour which could also result in the damages seen. A fifth dolphin, a female found in Koombana Bay in July 2012, is awaiting post-mortem examination.

An unusual case was a stranding on the 9th January 2012 of a Gray's beaked whale at Dalyellup Beach (see picture). Beaked whales are relatively solitary in their life-style and are deep divers; as such they are rarely seen and studied. No signs of significant infectious or parasitic disease were found however analysis is ongoing to determine whether acoustic trauma may have been a factor in this individual's death.



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