

It Takes More Than Two to Tango

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(Summits to Seas Photography)

As winter dawns on the South coast of Australia, the largest cuttlefish species in the world gather to tango - but this is no ordinary dance of love.



IT TAKES MORE THAN TWO TO TANGO

It is July, and the Australian giant cuttlefish (*Sepia apama*), the largest of their kind, have abandoned their normally solitary lives to gather in the tens of thousands in the shallow waters of Australia's Upper Spencer Gulf. They are here for one reason, and one reason only - to display their elaborate costumes and dance prowess at what is known as the only mass spawning aggregation of cuttlefish on Planet Earth.

It is not known how far these intelligent aliens migrate, or why they choose this particular location, but each year, without fail, they arrive along the same tiny stretch of coastline. While we like to think they are here for love, it is purely about perpetuating their species - it is magical nonetheless.

As we descend into the icy shallow waters at Point Lowly, a rocky coastline between Fitzgerald Bay and False Bay and 30 minutes away from Whyalla, South Australia, thousands of giant cuttlefish graciously levitate above the surging sea grass meadows.

Unsure as to where to point our cameras, we decide to finally settle by a small female, hoping to capture the elaborate mating spectacle that continues to fascinate and puzzle scientists and divers alike.

It is not long before the Tango begins, as an entourage of potential male suitors make themselves known - all on high alert for the brief opportunity to mate. Yet with males believed to outnumber females at eleven to one, the question remains - how does she eventually decide? Weighing in at up to a staggering 10 kilograms and one metre in length, we see there is a great deal of handsome fellows lined up for her to choose from, and they are all ultimately fighting for her attention and affection.

Neurally organised cells under their skin trigger a kaleidoscopic display of patterns, colours and textures, indicating their romantic intentions. Hypnotically strobing, their costume changes are as frequent as they are galactic, as they dance around her as part of some obscure ritual. A large bull male bravely muscles in close,



his elaborate costume engulfs her. Smothering her with his long sinuous arms outstretched, his profuse strobing outwardly signals his dominance and other suitors begin to retreat.

As we scan the surrounding area thoroughly, she appears to have eyes for someone else. From the left of the stage, an underdog cautiously approaches her; he is small, and to be honest, we cannot possibly imagine what she sees in him.

Without delay, he reveals his secret arsenal - mimicry! Cunningly, he attempts to disguise himself as a fellow female, hiding his male fourth arm (hectocotylus) and artfully moving in closer. The neurally organised cells under his skin reveal a mesmerising display, to the point that he now astonishingly appears female. He dances around the dominant bull male who appears to no longer be threatened, but rather hypnotised and somewhat delighted that there is now not one, but two females in his midst - or so he believes!

< Anita Verde with three cuttlefish

v A macro portrait showing the eye and skin colouration and texture

^ Cuttlefish pairing up



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With males clearly outnumbering females, we expected that it would be the strongest of all the males present that chose who got to mate, but surprisingly it was the female who decided. To warn off male suitors she does not find charming, she displays a white horizontal stripe on the side of her body. To our disbelief, she begins to pulse it momentarily in the direction of the dominant bull male; he edges back ever so slightly; just enough to allow the smaller male to take centre stage. It is not long before

“Remarkably, the stealthy smaller male has successfully stolen her heart - right out from under the dominant bull male’s nose”

she welcomes the smaller male’s advances. The pair meet head-to-head in a fiery and passionate embrace, as he passes her his sperm package which she stores in a small opening under her mantle - a process which can take up to an incredible seven minutes. Remarkably, the stealthy smaller male has successfully stolen her heart - right out from under the dominant bull male’s nose. The bull male looks upon them unimpressed. It seems it is all brains over brawn when it comes to cuttlefish love!

v A small male cuttlefish sneaks in to mate with the female, while the bull male looks on unimpressed! Clearly its brains over brawn when it comes to cuttlefish love

> Cuttlefish pairing up and dance the tango



But not all is lost for the bull male. In fact, female giant cuttlefish are polyandrous and will mate with many male giant cuttlefish. This should not come as a surprise as cuttlefish happen to have three hearts! She delicately collects and stores the sperm packages from her multiple partners until she is ready to produce her eggs, where she will then select one special package of sperm to fertilise them. The underside of a rocky ledge is the perfect place to secure her precious tear-shaped parcels, where in a few months they will hatch - while she herself will die.

Giant cuttlefish are semelparous, meaning they only have one reproductive event in their lifetime. A female’s life is therefore fleeting - usually surviving less than two years. Sadly, as each male fulfils his life-long mission of mating with as many females as possible, he will also face the same fate as his female counterparts.

As spring emerges, their eggs begin to gradually hatch; surrendering thousands of juvenile giant cuttlefish into Australia’s boundless green seas. Like their parents, the hatchlings will soon leave the breeding grounds, albeit to return a year or so later to the same stage on which they were born. To dance the same dance their parents did.

It is not really known how long dense gatherings like these have been taking place; yet with the earliest fossils of cuttlefish dating back to the Cretaceous period 145.5 million to 66 million years ago - you do the math.

In all our year’s diving, we have never seen such vast numbers of a single species anywhere in the world, but for the Giant cuttlefish, it has not always been this way. Commercial fishing saw giant cuttlefish populations in Australia’s Upper Spencer Gulf diminish from around 180,000 in 1999 to critically low levels of just over 13,000 in 2013. As a precautionary measure, and to ensure that fishing did not place additional pressure on the already alarming low giant cuttlefish population, March 2013 saw the South Australian Government prohibit the targeting and taking of all cuttlefish in the northern Spencer Gulf. This allowed the populations to gradually and naturally recover over the past decade. However, in February 2020, this fishing ban was surprisingly lifted, raising new concerns that cuttlefish populations may yet again plummet now that their protective veil had been lifted.

Although the South Australian Research and Development Institute's (SARDI) Cuttlefish Population Survey estimated that a whopping 247,146 giant cuttlefish visited the breeding grounds in 2020 (an increase of 116 percent from the previous year and setting a distinct record to date) SARDI's most recently published Cuttlefish Population Survey in 2021 confirmed a significant decrease in abundance year-on-year, with an estimated 107,847 giant cuttlefish visiting the breeding grounds in 2021. This is the lowest value seen in the past seven years and a concerning decrease in the population by 56 percent compared to the previous year.

Dr Mike Steer, the Research Director of SARDI's Aquatic Sciences, said the population during the 2020 breeding season was exceptionally high, and that 2021's tally was in line with the numbers recorded over the last decade. "This species has a life cycle of less than 18 months, so large variations in the population size are expected", Dr Steer testified.

While the recovery in the cuttlefish population since 2013 has been relatively steady, as a precaution, a permanent cephalopod (squid, cuttlefish, octopus) fishing

closure remains in place at the False Bay/Point Lowly breeding grounds. This closure prohibits the capture of any cephalopods within the area at all times. But just because there is a 'no go' on the breeding grounds themselves, does that mean the species is adequately protected?

Following increased community pressure calling for better cuttlefish protection, 2021 saw an extension to the fishing closure on the breeding grounds with the establishment of a new, but temporary 100-metre trial zone. This additional zone remained in place during the 2021 breeding season from 14 May to 10 August 2021; it may be considered for reinstatement during the anticipated 2022 breeding season following advice from the Government's Cuttlefish Working Group.

“This species has a life cycle of less than 18 months, so large variations in the population size are expected”

- Dr Steer testified

v A macro portrait showing the eye and skin colouration and texture

> A small group of four Giant cuttlefish



Although the increased protection was welcomed, some locals feel that protecting just the breeding grounds themselves does not go far enough. They attribute the decrease in the population of cuttlefish in 2021 to the concerning fact that the migratory paths the cuttlefish take to reach their important breeding grounds are no longer protected. Therefore, the perilous paths expose the cuttlefish to continued fishing pressure long before they have had a chance to breed.

The Heritage - listed Point Lowly Lighthouse - stands sentinel, marking the area between the 'go' and 'no-go' fishing zones. In one area, fishermen gather attempting to harvest cuttlefish on their way to and from the breeding grounds; while in another area, dreamy eyed divers complete with blue lips and chattering teeth gather in icy waters to marvel at what is one of the most phenomenal events in the natural world.

Commercial dive operator and dive shop owner Tony Bramley has been observing the annual Australian giant cuttlefish aggregation at Whyalla since 1979, and considers the Government's lifting of the 2013 fishing ban as a "reckless policy decision".

"Australia is signatory to the International Precautionary Principle Agreement, this principle precludes fishing a spawning aggregation unless we fully understand

the effects of any such fishing effort. We do not know the effect of this fishing effort in respect of this aggregation. This reality alone should prohibit fishing this stock. We need an immediate reinstatement of the protection that was in place from 2013 and a ban on all fishing of this animal" he emphasised.

What is ahead for the species remains to be seen. While South Australian Government officials have stated that fishing has a negligible impact on the giant cuttlefish population when the breeding grounds themselves are protected, the recently approved Clean Seas kingfish farms in neighbouring Fitzgerald Bay were also seen as a potential risk to the cuttlefish population. Located 6 and 13 kilometres north of Point Lowly, where the Australian giant cuttlefish aggregate each year, it is feared that farming of the annually-approved 4,245 tonnes of kingfish could increase the nitrogen load in local waters and therefore, the risk of increased algae blooms which may affect the ability of the cuttlefish to securely attach their eggs to the breeding ground's rocky ledges. This, combined with the risk that escaped kingfish may pose to other marine species in the Upper Spencer Gulf through their aggressive and predatory feeding behaviours, is of concern to the locals.

In a written statement, Shane Roberts, General Manager of Aquaculture at the South Australian Department of Primary Industries and Regions (PIRSA) said, "As part of the assessment process for the applications, SARDI undertook oceanographic modelling to demonstrate the spatial footprint of aquaculture-related nutrients in the Upper Spencer Gulf. The results indicated for a farming biomass of 4,245 tonnes, nutrient levels will remain well below national water quality guideline levels, both within and outside the farming areas".

"The scientific data demonstrates negligible to low risk to seagrasses and the Australian giant cuttlefish population. Despite this, substantial ongoing environmental monitoring in the area has also been required of Clean Seas", he explained.

With the first of the kingfish stocked to the two farms in September, locals are keeping a watchful eye on the project and its potential impact to the marine ecosystem. Whether it is the pressure fishing places on the species, or the potentially detrimental impact of fish farms, locals want the State Government to err on the side of caution when it comes to protecting these incredible cephalopods. It seems that the delicate dance between nature, tourism, and industry will continue to play out for years to come. After all, this is the single known dense aggregation of giant cuttlefish – and it happens nowhere else on Earth.

Following Sir David Attenborough's coverage of the aggregation in the BBC's Blue Planet series, more and more people have become

aware of this event, creating an extraordinary opportunity for the local visitor economy. Recognising this potential, in 2018, the Whyalla 'Cuttlefest', an annual festival spanning the breeding season from June to August was founded. Aimed at celebrating the species and educating visitors about the cuttlefish and their incredible importance to our oceans, locals attest the event has reinvigorated the township; it has created a heightened sense of community, identity, and most of all - pride. It is evident that this dominantly mining and steel manufacturing town is on the cusp of reinvention - changing the way it looks to the world, and slowly becoming recognised for hosting one of the greatest shows on Earth.

There is no doubt that to witness this event is indeed a privilege, and an incredibly rare glimpse of Mother Nature at her absolute finest. Complete with fiery embraces and frequent, elaborate costume changes, this is undeniably the Tango show of the seas. But what's more incredible? Well the cuttlefish did not even seem to mind us watching. **AD**



Anita Verde and Peter Marshall have a passion for the planet's wild places, and through their images and narratives hope to inspire better appreciation and protection of the natural world. Based in Melbourne, Australia and with professional

backgrounds in tourism strategy, environmental sustainability, and government relations, when they are not underwater or on a mountaintop, they also work professionally as strategic consultants, advising governments and industry on sustainable destination planning and development, investment attraction, government relations, brand strategy and marketing. Read more about them on: www.summitstoseasphotography.com

*The authors travelled at their own expense



> The heritage listed Point Lowly lighthouse at dusk

GETTING THERE

The Australian giant cuttlefish aggregation takes place annually at Point Lowly, near Whyalla in South Australia, which is just over a 4-hour drive from the city of Adelaide. Australia is easily accessed from major Asia-Pacific and Northern Hemisphere cities, while Adelaide is serviced domestically from all major Australian cities

BEST TIME

The giant cuttlefish begin to arrive in the shallow waters at Point Lowly towards the end of May each year and aggregate in the area until around early August. While each season is unique, the months of June to early July are considered peak breeding months and are believed to offer the most extraordinary encounters and highest concentration of cuttlefish.

Keep in mind that the water temperature can get down to a chilly 10-degrees Celsius, so if you are not dry-suit certified - you have been warned! The dive can also be very weather dependent, with strong ocean surge and poor visibility, so it pays to have some flexibility built into your diving schedule



HOW

Witnessing this event is easy, with the very experienced and knowledgeable team at Whyalla Diving Services offering guided cuttlefish diving, alongside equipment and tank hire daily during the breeding season. Visit: www.whylladivingservices.com.au to find out more

- Adelaide
- Whyalla
- ▲ Point Lowly

AUSTRALIAN GIANT CUTTLEFISH

SCIENTIFIC CLASSIFICATION

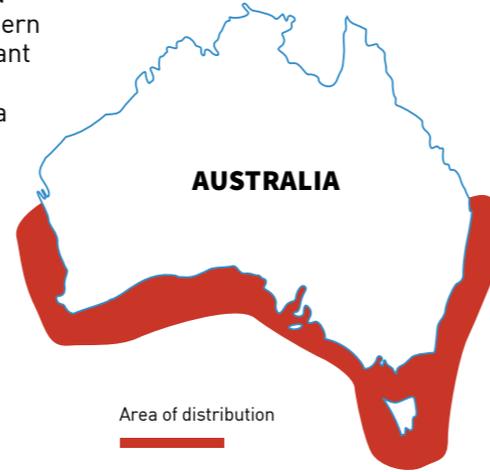
Kingdom : Animalia
 Phylum : Mollusca
 Class : Cephalopoda
 Subclass : Coleoidea
 Superorder : Decapodiformes
 Order : Sepiida
 Sub order : Sepiina
 Family : Sepiidae
 Super Family: Sepioidea
 Genus : Sepia
 Species : Sepia apama

CONSERVATION STATUS

EX EW CR EN VU **NT** LC
 Extinct Threatened Near Threatened

GEOGRAPHICAL DISTRIBUTION

Endemic to Australia, and restricted to cooler southern waters, the Australian Giant cuttlefish can be found across southern Australia from Pointes Cloates in Western Australia to Shoalwater Bay in Queensland. It is also found around Lord Howe and Norfolk Islands



HABITAT

This species is a neritic species that occurs in numerous habitats including: coral reefs, rocky reefs and seagrass meadows, alongside muddy and even sandy areas

Key Areas of the Cuttlefish Anatomy

Skin colour changes to mimic and reflect the environment and is used in complex mating rituals

Large, highly developed brain

Mantle

8 short arms with suckers on the undersides and 2 large tentacles with suckers on the flattened ends

Fins or 'skirt' extend all the way along the mantle

Cuttlebone - a gas filled shell inside the mantle and necessary for buoyancy control

Siphon

Large complex retinas with 'W' shape for light protection

Maximum Size
Up to 1 metre (males)

Maximum Weight
Up to 10 Kg (males)



Threats

FISHING AND HARVESTING

The Australian Giant cuttlefish is the target of commercial fisheries. Targeting of the mass spawning aggregations in South Australia's Upper Spencer Gulf in the 1990's caused a significant collapse in Giant cuttlefish populations, with as few as 13,000 visiting the breeding grounds in 2013. While numbers rebounded significantly following the temporary closure of the fishing grounds, the recent 2020 reinstatement of fishing in the area means the fishery in the Upper Spencer Gulf remains of particular concern. Because the species is short lived (1-2 years), and is semelparous, the impacts of such fishing can be catastrophic to the species survival. The species is also collected as by-catch

OCEAN ACIDIFICATION

Ocean acidification caused by increased levels of carbon dioxide in the earth's atmosphere remains a potential threat to all cuttlefish species globally. Studies indicate that when under high pCO₂ concentrations, cuttlefishes actually lay down a denser cuttlebone which is likely to negatively affect their buoyancy regulation

PREDATORS

Giant cuttlefish are vulnerable to being preyed upon by albatross, dolphins and sea lions, particularly during the breeding season where they gather in large numbers in shallow waters

DIET

The species is active by day preying on numerous species of fish, crabs and other crustaceans





SKIN

The Giant cuttlefish has up to 200 chromatophores (pigment cells) per square millimetre allowing it to display a kaleidoscope of colours, patterns and textures. The species even has regional differences in the male's colour patterns, indicating that there may be distinct populations or sub species across the Australian population. Individuals from the east and southern coasts of Australia show both morphological and genetic differences and it has been suggested that those aggregating in South Australia's Upper Spencer Gulf may indeed be a separate species

CUTTLEBONE

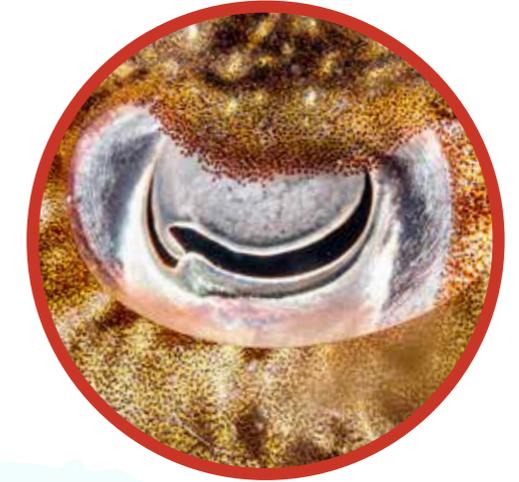
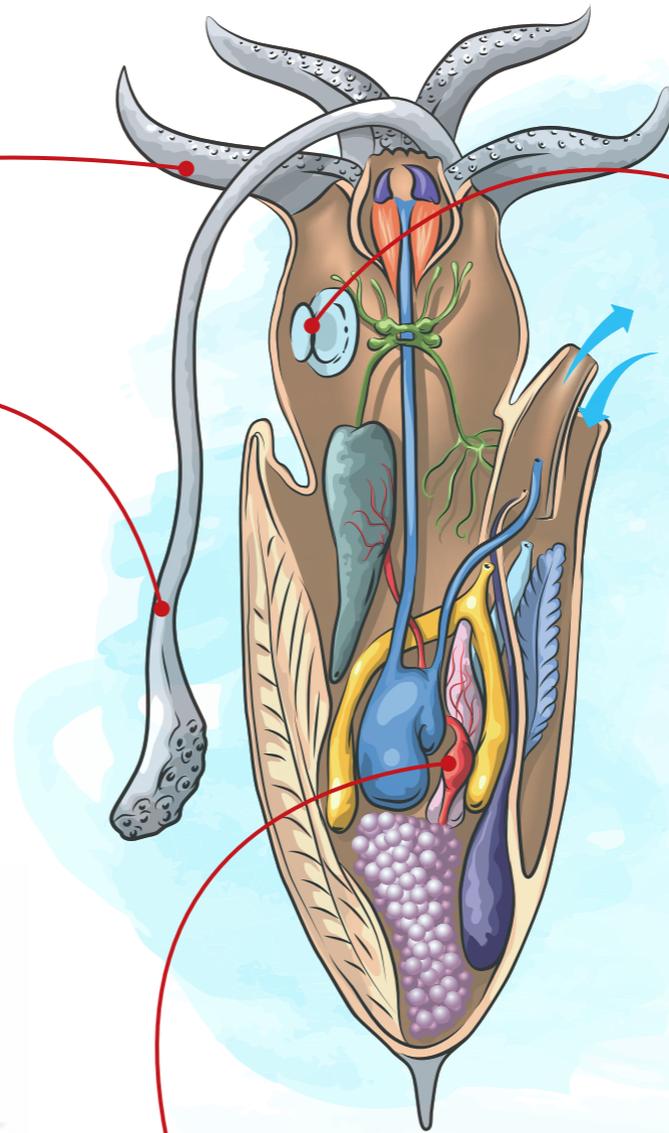
Enabling the cuttlefish to remain on the bottom or swim freely at any depth, the cuttlebone is an important gas filled space that acts as an important buoyancy mechanism. The cuttlefish can change the density of its cuttlebone simply by pumping liquid in and out of the chambers within it, altering its volume



The internal shell or bone of dead cuttlefish

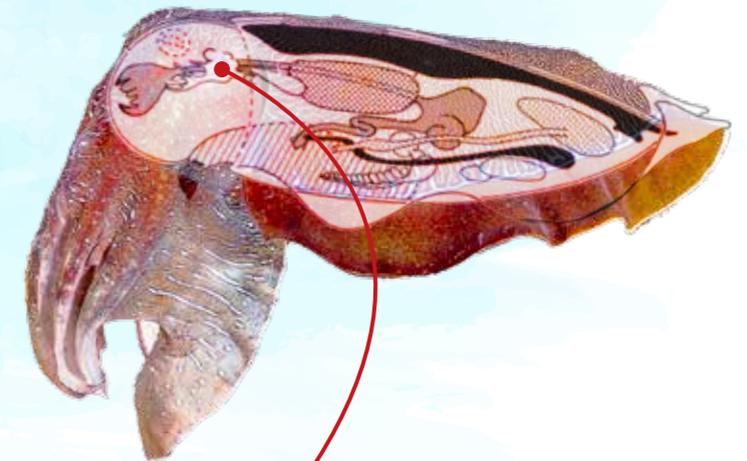
ARMS AND TENTACLES

The Giant cuttlefish has eight short arms and two large tentacles with suckers which it uses for catching prey. Unlike the octopus who often uses its arms to move or carry objects, the Giant cuttlefish uses its arms to lure its prey. When a potential meal is in reach, such as a shrimp or small fish, the cuttlefish will alter the colour of its skin and wave its arms in a hypnotic display. This lures its prey within reach of its two strong tentacles which it uses to strike



EYES

The Australian Giant cuttlefish can be identified by two rows of three skin flap-like papillae over each eye. Although the species is colourblind, it has some of the most highly developed eyes in the animal kingdom - seeing well in low light and detecting polarised light. The cuttlefish's distinctive 'W' shaped pupils help control the intensity of light entering its eyes



BRAIN

The cuttlefish is super intelligent and has one of the largest brain to body size ratios of any invertebrate, and just like the octopus can even use visual clues to solve complex puzzles **AD**

HEART

Believe it or not, but the Giant cuttlefish has three hearts! Two for pumping blood to its large gills and the other for circulating oxygenated blood throughout the rest of its body