



Blue Swimmer

Newsletter of the Friends of Gulf St Vincent

Issue 27, October 2016

President's Message

The latest Bluey reports on the Community Forum held at Port Noarlunga in early June. The main theme was the health of the Onkaparinga River and Estuary, and it is sobering to remember that the issues challenging this catchment are pretty much the same for all the waterways discharging into Gulf St Vincent (particularly on the eastern side).

How that has all changed in the past couple of months! Rainfall has filled our reservoirs to 97% and water has been released from the Mount Bold and Kangaroo Creek reservoirs and is spilling over the Clarendon and Torrens Weirs. What irony after the Forum talks describing the silting up of the Onkaparinga mouth and minimal flows in recent years. There is stream and coastal erosion to a frightening extent, and brown water extending far beyond what it has been off the coast.

I recently heard a presentation on the Virginia Pipeline Scheme, which supplies treated wastewater from Bolivar to horticulturists on the Northern Adelaide Plains. It was great to hear of the successes that have been enabled by NOT discharging this wastewater into the Gulf. Together with similar initiatives at Glenelg and Christies Beach, and the closure of Penrice, the largest sources of nutrients into the Gulf have now been significantly reduced. Which leaves stormwater as the next big issue to tackle.

A look at the metropolitan coast after the recent heavy rains reminds us of how much of a monster challenge this poses. It will be interesting to see an analysis of this winter. In the meantime, it is hard to imagine how to manage such a deluge, with ground saturated and reservoirs full.

The Western Adelaide Coastal Residents Association recently took part in a workshop that focused on the coastal erosion at West Beach. Other participants included City of Charles Sturt representatives, reps from SARDI, Adelaide Shores, EPA, the Coast Protection Branch and Surf Lifesaving Clubs.

A series of presentations were provided identifying changes observed at West Beach and potential opportunities to resolve the issues identified. Participants at the workshop were asked to discuss their key objectives for West Beach. A whole group debrief was then undertaken to develop the common set of objectives:

- Restore the dynamic equilibrium of the beach using a whole of coast approach
- Implement an integrated approach to beach management (ie bring together scientific and engineering information, government and independent sources of information/expertise, involve stakeholders and broader community, collect and use appropriate data, undertake periodic reviews and use adaptive management approach)
- Restore sea grass
- Communicate and educate to empower the community to be advocates for the beach
- Make the beach a priority for the State
- Create a beach where people want to spend time
- Create a safe beach environment
- Recognise the economic benefits that a healthy beach delivers
- Protect infrastructure along the coast

The FoGSV support these objectives.

Angela Gackle

President, FoGSV

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Councillor Bill Jamieson – City of Onkaparinga planning for the future

The Onkaparinga Council is developing a ten-year strategic plan, together with the state government, that will bring the Onkaparinga river, and the riverine environment, back to health. The reef, cliffs, surfing reserve, diving and the river are spectacular, but it is actually a very fragile environment and the more impact we have upon it the more issues we have.

Bill recently attended the Australian Coastal Councils' Conference and noted with interest that there was no argument about climate change – everybody is aware of CC and accepts that we need to prepare for it. While a 3-4 mm per year sea level rise is predicted, it's the droughts and fires and the incredible storms that are occurring more regularly now – not just once in a hundred years – that are the big issue. And the conference was all about adaptation. The Adelaide Metropolitan Seaside Councillors have met with SA politicians to work towards a state coastal policy. It is an issue that can't be fixed by Councils without Federal and State contribution. The Federal Government has 86% of the tax revenue, the state government has the power, and 11% of the taxes, but local government has the problem, with 3% of the revenue. So it really is a national issue.

European settlement began in this area around 1840 with Old Noarlunga as the business centre and Port Noarlunga, which was protected by the reef.

From the SA Register of 1844 “the river is about 20 feet deep nearly the whole way to the sea, but unfortunately, at the mouth, there is an awkward bar. We are happy to hear however that flat-bottomed boats of 20 tons can enter and depart with cargo twice each month, and smaller craft at all times.”

In 1854 the tramway was constructed and there was a towpath along the river. The Onkaparinga is the largest permanent river that rises and falls within SA and the estuary, which is about 10.5 km long, is the third largest in extent after the Coorong and Port River estuaries. So this is an important feature of our land and our history.

While the river was 20 feet deep (6M) at early days of settlement, it is now a seriously degraded river, particularly with regard to the depth. Other than at high tide it is almost impossible to paddle all the way to the sea. And quite often now it is possible to walk across the mouth.



At the moment about 4% of normal flow is coming down the river, and at drought times there is nil flow. That's understandable as water security is the priority and is why we now have a desal plant. It's not the first time the river has been in these straits. In 1983, after extensive lobbying by the Councillors of the city of Onkaparinga, the government did act, and dredged part of the river but it looks like they were looking for a quick fix. As time goes on though the problem has not been solved.

There are some conflicting activities in the river – there are environmental problems and at the same time there are recreational and sporting activities on the river. There is canoe hire, racing and training of surf lifesavers, kayakers, Olympians, national and state championships. There was a “head of the river” rowing event for three years until river levels made it too hard. A Southport river rowing club started up, but ended up doing more walking than rowing. There is also school aquatics, and fishing. It's interesting to talk to the fisher-folk – especially the older ones who can tell you about the sorts of fish they used to catch in the river. Nowadays it's pretty slim pickings.

The river itself is the centre of major growth in the City of Onkaparinga. Under the 30 year plan for medium density there are now some environmental changes. Where there were once flows coming down the river and through the estuary, it is now a salt water estuary, and this is likely to be the norm. It is unlikely that the river will get significant regular flows down the river from the Clarendon weir.

In 2004 there was a plan focusing on weed control, wetland plan management and erosion control and Council contributed about \$65K. There has been some very good work done, including many volunteer hours spent in and around the riverine area. The Noarlunga meatworks have closed and stormwater now, in most cases, doesn't go straight into the river but is filtered via wetlands.

An EPA report says the water quality is now good, and safe for swimming – if you can find enough water!

Medium to high density urban infill

A new development plan amendment will boost areas like Beach Road, Gulf View and Cliff Avenue over a 30 year planning period. 80% of growth will occur in infill areas, and the river sits in the middle of that zone. 22% of the city is now zoned medium density, virtually from O'Sullivan's Beach to Moana and east to Morphett Vale is now all medium density, and the population is increasing. The city is planning for 6,000 -10,000 more people in and around Noarlunga, and Noarlunga Centre will become high density. Christies Beach growth rate is 1.52%, which is 20% higher than the city annual growth. Population change will be 32% by 2036.

In 2011 the population in suburbs around the river was about 55,797 and in 2021 (only four year off) that will grow to 61,500. The point here is that there is a great loss of private open space. Bill has about 600 M² of private open space around his home. In medium density homes a 3br dwelling gets 24M² of open space. If you have a 4x4M balcony you have 16 M² of space. If all this is happening throughout this area, where will families go? The Onkaparinga Valley and River is in the heart of this – our lungs and parklands. The impact on the river will increase.

So how do we return the river to health. What happens if we dredge the river? Where will the spoil go – onto the reef? One idea proposed was to install superpumps with pipes up to the head of the river. Another idea was to build a retention dam and work back upstream from there.

A feasibility study, with expert advice will be required before we go ahead. What do we do with the spoil? There is also a dump on the northern bank that was closed around 1980 and we know there is some leaching from the dump. How do we make that valuable piece of real estate, which backs onto where all this development is occurring, safe for residents. This time we want a long-term solution.

Government and councils generally don't want to bear the costs of such work. Up until the Clarendon weir was built, the river looked after itself. Old surfers talk about the sand banks off the Point where they surfed. So the river was viable until the flows were reduced. Bill maintains it is a state issue and a state solution is required. The Port River is a good example of how things can be improved, as is the Torrens linear park downstream of the weir.

The State government can do it, perhaps using levies such as the NRM levy (City of Onkaparinga has paid about \$15M into the levy since 2011-12) and the City has a growth revenue of about \$3M. Priorities need to change to divert money to these issues. The Noarlunga dump is a real problem. \$7M has been spent fixing the Kangarilla Dump and a great job has been done with the dump up at Maslins, but the priority now needs to be here where the population growth is.

There is an EPA waste levy - \$65 per tonne of waste dumped is paid to the government. They have collected \$10M, and the fund currently contains \$50M which has also not been accessible to the Council.

There are many trails, and coastal walks etc, and more links could be created on the north bank. The south bank is stunning – kangaroos and other wildlife are common in the middle of the city, and the Oxbow lagoon is also a beautiful environment. Unfortunately the growth from Seaford Meadows comes bang up against it. The issues there are obvious with the impacts of kids being kids and dogs being dogs. As part of the strategic plan there should be some fences and stiles to protect the area up through the gorge.

It would be hard to find a more chaotic area than the north bank to the rail bridge, with trails and motorbike access. There needs to be a master plan. Good news, and contributing to improved water quality, is that the sludge ponds have gone, and in their place the government, to their credit, have spent quite a lot of money in creating quite a beautiful wetland area. We want this all along our river. If you get a chance to visit it, the location is east of the rail bridge. These are the things we want all along the river.

Also included in the master plan are activities that we want in that area cascading down from Dew Avenue into the William Hunt reserve and the dump (which will be gone)? One suggestion is a footbridge to cross the river at that location to connect the two sides and the caravan parks.

So in summary, in the Strategic Plan, the health of the river is our top priority, along with the riverine environment. Around the river we need to manage issues and risks that people bring into the area. We need to strike a healthy balance in recreational activities and needs of the City's citizens. We need to combine those things in our strategy to create a fantastic environment and activity centre.



Steven Gatti - Natural Resources AMLR Returning environmental flows to the Onkaparinga River

Environmental water requirements, or environmental flows are defined as the volume, timing, frequency and duration of flow needed to maintain aquatic ecosystems in a low level of risk.

Environmental water provision is a negotiated outcome that considers all water users in determining how much water is available for the environment. In the case of the Onkaparinga, the agencies that are involved in agreeing on flow are the AMLRNRMB, DEWNR and SA Water.

The environment was first acknowledged as a legitimate user of water in 1994. Investigations and planning for environmental flows in South Australia were conducted from 1999- 2005, resulting in prescription of water resources for the Western

Mount Lofty Ranges in 2005. Between 2005 and 2013 the AMLRNRMB worked in collaboration with the community in the Fleurieu, Adelaide Hills and McLaren Vale areas. A series of committees developed policies for water sharing and management taking into consideration social, economic and environmental needs. The committee members represented different areas, industries, skills, interests and experience.



The WMLR Water Allocation Plan was adopted in 2013 and Natural Resources AMLR began conducting environmental flows trials in 2011.

Why are environmental flows needed?

Prior to construction of the Clarendon Weir, water flows in the Onkaparinga River were around 50ML per day for around half the year. Since the construction of the weir there is no flow for 90% of the year. The current situation is that for half the year there is a flow of 6ML/day.

The consequences of low flow include:

- Reduced flow and water quality can produce a build up of filamentous algae that can smother habitat
- Flooding flows keep the river bed free of trees and shrubs that shouldn't be there
- Fish such as galaxias are emaciated and diseased, with rupturing emergent parasites

What flow is needed to maintain estuary health?

Research suggests that for a healthy estuary, the minimum flow requirement is around 20ML/day, twice between February and May, lasting 15 days each time. The Onkaparinga has been receiving virtually no flow.

The benefits from environmental flows include:

- Regular breeding and population sustainability for native fish
- Disruption of non-native fish habitat
- Enable macroinvertebrate life cycle completion
- Provide access between marine and fresh water environments
- Extend and improve aquatic habitat (pools and riffles)
- Maintain water levels and water quality in pools into summer

- Reduced terrestrial plant species within the main channel

What do environmental flows look like and how are they delivered?

During the first year of environmental flows trials flow rate was plotted throughout the year and a number of flow components were replicated to create conditions that are close to natural conditions. Where possible natural flow events were incorporated.

Low flows keep pools connected and riffles flowing. Fresh inflows create more habitat, facilitate fish movement and keep terrestrial vegetation out of the channel. Flush flows scour stream sediment and vegetation and improve access with the sea.

Did they do the job?

To determine this the team monitored macroinvertebrates, stream habitat, fish and aquatic vegetation.



There is some evidence that environmental flow releases are having a positive effect on native fish and an adverse effect on alien fish, ie a shift towards native fish/away from exotic species. Eastern gambusia and gudgeons have decreased in abundance. Common galaxias and Mountain galaxias have dispersed with higher flows. Congolli and common galaxias are migrating inland. Increased flow corresponded to higher rate of disease across broad range of species. Pouched lamprey has been recorded for the first time in 100 years. Desmids have also been found.

There is no evidence that vegetation of the four river reaches had changed significantly in response to eflows. Riffle habitats in the Onkaparinga River only exhibited changes in vegetation community.

We are trending towards a drier state. Trend towards increasing domination by reed beds and amphibious trees (e.g. Ash).

What next?

- Amended environmental flows will continue as possible depending on water availability and rainfall.
- Hydrological and fish monitoring continues.
- AMLR NRM Board, DEWNR and SA Water are in the process of revising license conditions.
- Refinement of environmental flows will be based on continued evaluation of monitoring data.



Rob Bosley - Pt Noarlunga Art Project

Rob has been working on the Port Noarlunga Reef Public Art Project, also called the Blue Groper Project. The original idea for this sculpture was proposed for the jetty at Glenelg. Rob inherited this project from a previous president, and we thought that Port Noarlunga would be a better place for it.

Around that time there was an item in the Reefwatch newsletter reporting that, after an absence of about 50 years, there was evidence of the reappearance of the blue groper in Gulf St Vincent, with the first sightings, of juveniles, on the Port Noarlunga reef, and then a photo was captured in the vicinity of the Adelaide Desal Plant, where they are monitoring activity and marine life. The hope is that they may eventually be back in numbers.

The initial meeting was held in Feb 2013, and involved local residents, artists and environmentalists. The approaches to the Port Noarlunga Reef were considered to be an ideal site for a significant art installation, and that the artwork would be a way to convey messages relating to our Secchi monitoring project to see if we can improve water quality enough to re-establish not only the blue groper but also other species on the reef.

The blue groper, actually a wrasse, is an incredible creature. The Western Blue Groper (WBG) range is southern Australia from Perth to around Melbourne, and there is another species on the eastern seaboard. They are the largest carnivorous fish found on our reef, grows to a weight of 40 kgs, and analysis of the rings of their ear bones indicates that they can live for up to 70 years.

All WBG begin life as females, and some but not all change their sex to male. If the male is removed then the group's dominant female takes his place by changing sex and colour. The WBG is very vulnerable to overfishing. They take so long to reach maturity, and if caught they are affected by barotrauma – this happens if they are pulled to the surface too quickly – and they rarely survive.

FoGSV undertook this public art process to inspire, engage and educate the community on marine conservation. The Western Blue Groper is a representative species, but we are looking to improve all fish stocks here on the reef. The WBG is the canary in the mine shaft if you like, and if we get evidence that numbers are increasing it will indicate that conservation messages are working and the environment is on the improve.

We used local government guidelines in calling for expressions of interest through public advertisement and had seven registrants – all of very high quality. A public art reference team was formed and scored the submissions against a set of criteria and shortlisted them to three, who were interviewed on site about the size, cost, materials and time frames for their proposals.

In Phase 2 of the project the three shortlisted artist/s were formally engaged by the Friends of Gulf St Vincent to develop the artwork design proposal and develop concepts.

The 3 submissions were judged by the Public Art Reference Team against the following criteria:

- Examples of artwork of high artistic merit,
- *An understanding of the brief,
- Demonstrated ability to develop concepts and communicate ideas,
- Demonstrated ability to work on significant projects within timelines and budget,
- Experience with relevant materials.

On this basis Concept 3 by Anna Small and Warren Pickering was chosen and they were asked to further develop working drawings.



Anna and Warren have quite literally interpreted the site using the beauty of the shapes of the marine species within a simple but fun shape to capture the attention of the public and then in detail using written word to educate on closer inspection. The reef is very popular for diving, therefore, the use of the image of a dive mask is a starting framework for the sculpture. The landscape inside the mask and outside will consist of layered silhouettes of local temperate marine species of both animal and plants that you might see if diving in the area. These will be in varied metals, stainless steel and 3mm corten weathering steel. The structure is about 3 x 2

metres in size, and will be mounted, cantilevered out on the platform just north of the jetty.

Working with Council we have obtained Development Approval. Along with Wade Engineering we have had a meeting with Council's Planning Officers to seek Design approval. We are currently seeking a City of Onkaparinga Streetscape Grant for the artwork component. A further Environment Grant will be sought for the educational message contained in the accompanying signage.



The other two concepts may still also be pursued in the future once the Council has been able to stabilise the earth bank, and if more funding becomes available.

Another idea that is taking hold locally is perhaps holding a blues festival to further publicise this in the community.



Tim Kildea - Reefwatch

Reefwatch evolved from research developed by Adelaide University to assess the health of reefs along Adelaide's metropolitan coast. This was instigated by the Environment Protection Authority (EPA) due to concerns about status of the reefs in the region.

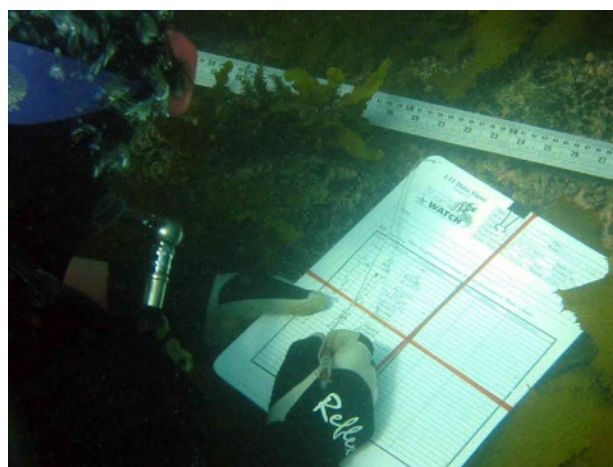
The reefwatch program has two primary objectives.

- To contribute to adaptive management of temperate reefs through ongoing monitoring. Reefwatch has been monitoring reefs off the metropolitan coast as there was concern that they were slowly deteriorating for a range of reasons. As with seagrasses, reefs don't respond well to high nutrient or sediment loads.
- environment through educating and engaging the public. Many people are interested in reefs and want to learn more about the plants and animals there. Its great being able to bring people, and particularly children, down to the intertidal reefs and wander about with them showing them the organisms that live there and opening their minds to what is out there.

Reefs are important for our fisheries – both for recreation and for commercial species. But they are also the rainforests of the sea. Macroalgae were

Tim's passion, partly because he could do experiments on them without needing ethical approval, but also because underwater plants are fascinating. The interest was sparked by people like Scoresby taking Tim along on dives and seeing the diversity of the underwater world. Tropical reefs get a lot of attention, so not as much is known about the temperate species.

Reefs and algae are the lungs of our planet. From 0-20 metres is a zone of great productivity. They are ecosystems of high biodiversity, formed by thousands of species, around 70% of which are unique to southern Australia. There are 400+ fish species, 6,000 + invertebrates and 1200+ red algae alone. Not just a zoo and a nursery – these many species form a range of distinct ecosystems that evolved long before European settlement and provide us with a range of benefits.



Reefwatch has been conducting surveys now for nearly 20 years, including subtidal surveys for 19 years, intertidal surveys for 10 years, both of which have amassed quite some data. Other programs are the Feral or in Peril which have been looking endangered species like the western blue groper and a number of marine pests. The feral monitoring has been very important, as it is relatively simple but has detected invasion by several specific species. For example the fan worm was first detected on KI by Reefwatch divers doing a survey, and led to a more extensive focus on the fanworm to see how far it had spread. Shark Watch started with looking just at Great White numbers but is now also looking at other species along our coast.

School sharks are commercially fished and as a consequence their numbers are plummeting, which has flow on effects for the whole marine food web. Marine Scientists in SA have a very strong connection to Reefwatch and the reef health information that it produces. Reefwatch is encouraging young scientists to use the data collected in their research.

Results from the data

The first lot of data relates to some key indices. When we do a subtidal survey of a reef we use a line intercept method and a fish survey and

invertebrate survey. The intercept method involves laying down a long tape measure and looking at and recording the changes in life forms along the transect line over time. That includes macroalgal cover, whether there are turf algae, mussels, sand or rock. The same is done for fish and invertebrates - cryptic species along the transect line. This is quite a sensitive method.

Initially we focussed on reefs on the metro coast – Broken Bottom, Hallett Cove, Noarlunga reef (north and south), Second Valley and at The Bluff, because it took some time to train teams of divers to carry out the surveys, but there have been a few surveys right throughout SA.

So what do the surveys show for the last 20 years at Port Noarlunga?

The data goes back to 1998, starting at Hallett Cove and then progressing further. We created a series of criteria for classifying the reef health status as good, poor or needing to be watched.

What it shows for Noarlunga north and south (inside the reef) is quite confusing. The graph shows that reef condition jumps between good and poor, dependent on the year.

About 70 different fish species have been recorded on the reef. On the northern side we started with about 30 species and that seems to be decreasing to about half that now. On the southern side it is remaining more stable. Are there changes in numbers? Fish are quite difficult to monitor as they are so mobile and easy to miss depending on water clarity etc.

Looking at the data, there seems to be a decline in numbers of invertebrate species on the southern side of the reef, and also a slow decline on the northern side. This was not something we anticipated.

Average macroalgal cover is even more intriguing. They are important as habitat for fish species and invertebrates. Both north and south sites inside the reef, appear to show a gradual decline from when monitoring started in 1998 until now.

The graph shows averages over the year, incorporating seasonal changes, which often are quite substantial. With macroalgae you can see periods of intense improvement - often from spring to late April, depending on the types of plants, and destruction after storm events, which can cause a lot of damage – ripping off clumps of algae and then recruitment again after. But even so there seems to be a dominant pattern over the years, a slow decline, and this is something we should keep an eye on. On the southern side of the reef, where we used to have around 40-50% macroalgal cover, is now down to less than 5% and the question is will it plateau there? On the northern side we have gone from as high as 60% down to less than 10%. This was surprising. There are a variety of factors that could be impacting

the reef, including divers – we are getting up to 5,000 each year on the reef. Generally this section of coast is looking better than it has for many years, and this has likely been helped by the reduction of nutrients entering coastal waters from Christies Beach WWTP and the wetlands on the Onkaparinga.

If it wasn't for volunteer divers doing these surveys we wouldn't have this long term data. The biggest challenge as marine scientists is tracking changes that occur over long time frames. An example of this is West Island – when we look at changes in abalone populations. We might expect to see the numbers bounce back after five or so years, but Scoresby's research shows that it can take more like 20 years or longer for populations to return to previous levels. And it's the same with seagrasses along the metro coast.

There is also data showing that temperature is slowly increasing in the Gulf, such that our March-April temperatures are a lot higher than in previous years. And we had a fish mortality event, which coincided with a very high temp. We don't normally have that data and it was purely coincidental that we had equipment off the coast here recording those temperatures in 2009 -2015. It's not clear whether that's climate change or just unusual temperature variation, so that's why long term data is important.

Continuing threats to our reefs are pollution, sedimentation, overfishing, trampling and climate change.



Over the past 20 years Reefwatch volunteers have contributed:

- More than 5,500 volunteer days
- More than 3,200 dive volunteers, >15,000 diving hours
- More than 2,000 intertidal volunteer days
- More than 11,000 people have been directly engaged by Reef Watch
- Thousands of subtidal and intertidal surveys have taken place all over SA
- Thousands of days of in-kind support from marine scientists
- Hundreds of beautiful marine images donated in-kind from talented underwater photographers

Reefwatch has won the AUSMEPA Environment, the UN Australia World Environment Day Award, The Premier's NRM Award for Outstanding Integrated Volunteer Project.

Reefwatch is supported by all SA government agencies with an interest in marine conservation including the Natural Resources, Adelaide & Mt Lofty Ranges, Department of Environment, Water & Natural Resources, Biosecurity SA (PIRSA), SARDI Aquatic Sciences, EPA.

The program is also assisted by hundreds of SA divers and boat owners, Dive clubs and shops in SA, Boating Industry Association of SA, SA Sea Rescue Squadron, Central Local Government Region of SA, Atlas of Living Australia, Royal Yacht Squadron SA.

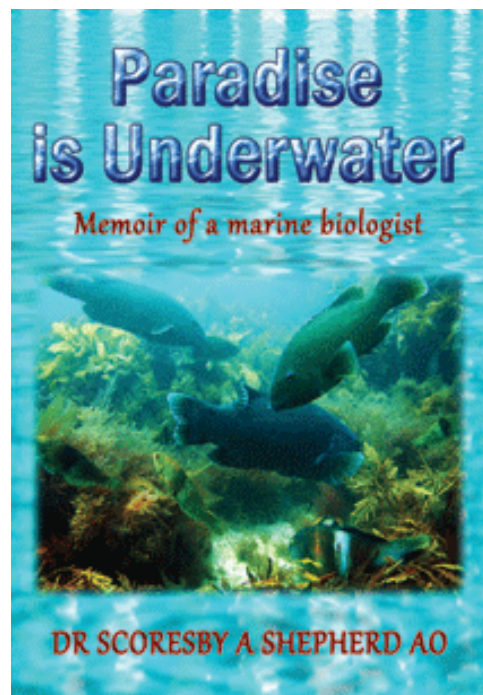


Scoresby Shepherd – Getting close and personal with fish

When Scoresby was writing the legislation for the Marine Park at Port Noarlunga, which was established in 1971, they had to select a southern boundary. Scoresby suggested the point to the south of the river, which meant they had the reef and river mouth covered. A few years later someone wanted to develop a marina there and the government was enthusiastic about it, but fortunately, according to the legislation, the park boundary was past the edge of the river, so the whole of the river is included in the protected area. So mistakes can be fortuitous!

Very few people understand fish – their habitat, behavior and intelligence and feelings – in fact we rarely even think about that. But their vision, senses of smell taste and hearing are excellent and some even produce and detect vibrations. Some species, such as herring, eject air from the swim bladder through the anus (they fart) and the others understand this, and it helps them to maintain the order that they swim in. That's pretty smart. Other species can detect the earth's magnetic field, so they can navigate over hundreds or more kilometres. They also have an extraordinary memory, and can learn spatially, recognising their territory. Port Jackson sharks, which lay eggs on the PN reef, migrate hundreds of kilometres. In eastern Australia they migrate from Tasmania to northern NSW each year to lay their eggs, and then they go back again. We don't know where they migrate from to lay eggs here, but it is likely to be from down south around Kangaroo Island. Their navigation ability is excellent. They have migration routes, they learn the location of foraging patches and they even accumulate cultural traditions.

Some fish live in social groups and many show aspects of social intelligence. Some species can even use tools, for example wrasses, which use objects to bang on sea urchins to crush them and eat their insides.



Another question is do they feel pain? We now know from recent studies they have the similar pain receptors as humans, so they show all the responses that we do when in pain. Overall we can conclude that their cognitive complexity is the pretty much same as other vertebrates. The only thing is that they don't come up and wag their tails and expect to be patted like a dog, although they are probably just as smart.

Fish suffer from parasites that get into their scales and gills. A few fish have developed a parasite cleaning service on the sea floor, and they've set up a "business", very much like one on land. It's generally located near a rock or a cave or a large sponge or jetty pile, and the cleaner fish – one of several species such as the six-banded coral fish – advertise themselves by evolving bold stripes and sometimes a false eyespot near the tail. This tells other fish that they are in the cleaning business. Then the clients arrive usually at a particular time of day. (SS studied this behavior for 19 years in one location on the south coast). It usually occurs only in summer, as they get few parasites in winter. Often there are a number of species that queue up waiting to be cleaned. The cleaner fish then goes from one to another, swimming over their bodies and poking around, and they open their gill covers for the little fish, so that they can remove the parasites from their gills and open their mouths to have their teeth cleaned.

As in businesses we set up, problems can occur. Some clients can jump the queue, and try to get priority. Sometimes cleaners can also cheat and they can bite the client's scales. Now this hurts – cleaning gives tactile stimulation and is very pleasant for a fish to have the cleaner grooming it – sometimes they use their fins to smooth it down and make it happy. But if they are bitten then the fish shakes itself in irritation and swims off angrily.

Sometimes the cleaner will try to seek reconciliation and swim after the angry client to bring it back. Sometimes a stranger comes up to be cleaned and the cleaner will give priority in the hope of bringing him back again. So we get all these complex behaviours, all of which we see in a market economy! Cleaning is excellent for the health of the fish. At West Island up to 50-60 zebra fish will come in to be cleaned at once and other cleaners came in to help!

At West Island Scoresby had a love affair with a wrasse. At first he started out by feeding her tid bits, and was eventually able to stroke her. She would follow him about and allow herself to be fondled. This started when she about 2 years old when he first encountered her and went on for about 5 years. Then, on one dive in October he noticed that she was looking a bit different, and on the next visit it dawned on him that she was changing sex. Her chest was becoming more prominent, and she developed the features of a male over about two months. Normally males are very flighty and wary. Scoresby had been calling her Lolita, and now had to amend that to Lolito. He still came up to Scoresby looking to be caressed, and then after another year or so he disappeared, most likely taken by a predator.

This is all in Scoresby's memoir, "Paradise is Underwater" along with many other fascinating aspects of his marine studies. The memoir covers his life from childhood to the work he has done over the years on fish, abalone and the people he worked with.



Mel Rees – Secchi Project Officer

The Secchi Project has been funded by the AMLRNRM Board since 2013. It is a citizen science project collecting readings on turbidity at locations around the Gulf.

Over a million South Australians rely on Gulf St Vincent for food, recreation and commerce. The Gulf is one of our State's greatest natural assets, but it is fragile. Over 9,000 hectares of seagrass have been lost in the Gulf. Seagrass underpins our marine ecosystems and fisheries, it helps with beach stabilisation, provides habitat and stores significant amounts of carbon.

One of the major causes of seagrass decline is turbidity, a measure of the water's clarity. Turbid water is often caused by sediment or dissolved organic matter in stormwater, wastewater or dredging. Turbid water can reduce the light that reaches seagrass for photosynthesis. Sediment can smother reefs and seagrass when it settles, and in severe cases



Igo Oak – photographer

Igo Oak was an early pioneer of underwater photography at the Port Noarlunga jetty, and he gave a slide show and spoke at the forum about his recollections of diving and other aquatic activities on and around the reef in the 60s and 70s.

sediment can block the gills of fish.

The Secchi disk is a cheap, simple way to get an indication of turbidity. The disk is lowered into the water until no longer visible. The measurement can be done from a safe location over water, such as a jetty or boat. The readings can tell us when it is safe to swim, highlight pollution hotspots and look at trends over time. New volunteers are always welcome to help us ensure our waters are safe for swimming and marine life.

The Adelaide Coastal Waters Study confirmed a link between turbidity and seagrass decline, due to reduced light/photosynthesis and nutrients that encourage epiphytes growth, smothering seagrasses. In extreme turbidity discharges you can get sediment settling on reefs and seagrasses and having direct impacts on marine life. It is also an issue for swimming and safety, not just for visibility, but stormwater can also carry irritant chemicals.

So the Secchi disk project is simple, and low tech, has been used for 150 years and is still used around the world. The aim of our project is to collect readings that allow us to see if there are any changes in water clarity over time that might give us an indication of areas of risks to marine health.

The project has been running for a few years now. We have 27 sites being monitored, mostly off the end of jetties, which are accessible and have deep water. A couple of people are monitoring off boats, inshore and we have 180 individuals involved, a lot of them school kids participating through their classes on a fortnightly basis. As much as this project is about collecting data, it also serves an educational role looking at how activities in catchments affect turbidity and marine life.

We have information available in various media and have produced a couple of promotional videos and some pamphlets – and we are trying to tap into social media as well. The main thing we are doing right now is preparing a database on the website so that we can show our results. and this is in development.



SNIPPETS

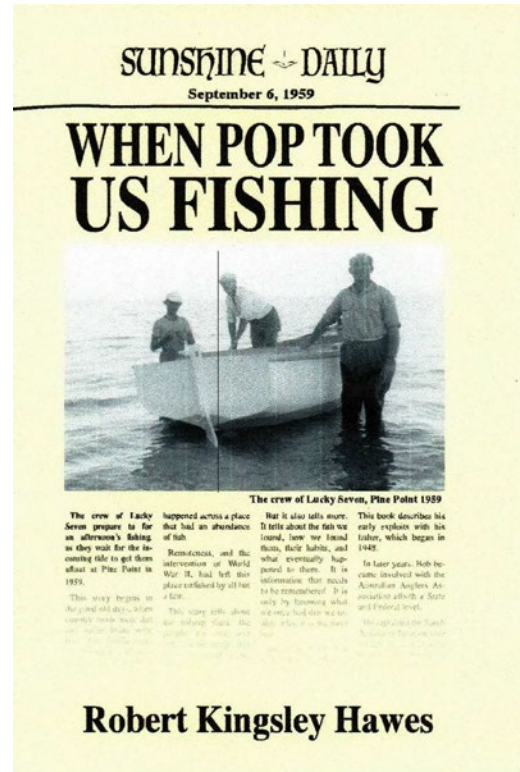
We welcome contributions from members and others who have something to say about the Gulf!

We were recently contacted by Bob Hawes, who gave a presentation to a FoGSV Forum some years ago at Port Vincent. His topic was fishing, as a third generation fisherman reflecting on his family's history in the business. Following the Forum, Bob was approached by a couple of members of the audience who had been very interested in his story. They urged him to document his recollections and with that in mind Bob joined a writing group!

Bob has now self-published his memoir, and is taking orders with the price for FoGSV members of \$8. Here is a taste of the content.

This story begins in the good old days, when country roads were dirt and trailer boats were few. Our family experienced the last of those good old days. We were novice fishermen, who happened across a place that had an abundance of fish. Remoteness, and the intervention of World War II, had left this place unfished by all but a few. This story tells about the fishing there, the people we met, and some of the things that happened along the way. But it also tells more. It tells about the fish

we found, how we found them, their habits, and what eventually happened to them. It is information that needs to be remembered. It is in knowing what we once had that we realise what it is we have lost.



Friends of Gulf St Vincent Annual General Meeting



Friends of Gulf St Vincent AGM

Members and friends of the Gulf St Vincent are cordially invited to join us for our 2016 AGM
Thursday 24 November

Henley Sailing Club
1 Esplanade, West Beach

5.30 (for 6.00pm) start 'til 8.00pm

Finger food provided

Guest speaker is Dr Tullio Rossi, as a science communicator with a passion for the ocean, he is helping scientists and institutions communicate complex ideas in a simple and effective way. Tullio's talk is based on his 3-time award-winning animation video *Lost at Sea*.

RSVP by 18/11/2016 to:
friendsofgulfstvincent@gmail.com