FRIENDS OF GULF ST. VINCENT

Blue Swimmer

Newsletter of the Friends of Gulf St Vincent

Issue 22, January 2013

President's Message

On behalf of the committee of the Friends of Gulf St Vincent I wish our readers a Happy New Year. 2013 is shaping up to be as environmentally challenging as last year with record high temperatures being recorded across Australia. More people have been seeking beaches and waterways as refuges for recreation and to escape the heat.

At our most recent Forum we sought experts' advice on the "The Health of the Gulf" and their following excellent talks have been reproduced from the Forum for this newsletter.

The major issues relating to the coast from last year remain in our focus and we will be tackling them again in 2013 - Port Stanvac, Marine Parks, Dredging, and Water Quality

Our Secchi Project will continue through 2013 and the results will begin to give a rough indication on "The Health of the Gulf". Without scientific evidence it is difficult to support our concerns regarding what is happening below the surface of our Gulf.

Our concerns are not limited to the local context as Global issues increasingly have effects on our Gulf. This became apparent over Xmas and the New Year when I travelled to the US and Canada - from extreme consumerism in Los Angeles to the wilderness of Canada.

In Canada water quality has gained widespread attention. Although Canada has over 20% of the world's fresh water, most of it is retained in lakes, underground aquifers and glaciers, and more than half of this water drains northward into the Arctic Ocean and Hudson Bay. As a result it is unavailable for the 85% of the Canadian population who live along the country's southern border. This means that, as in Australia, the remaining supply is the precious lifeblood of both the people and the environment.

Having previously lived in Canada I saw first hand the effects of climate change.

The Columbia Ice Field straddles the boundary between the Canadian Provinces of Alberta and British Columbia, and is the largest ice mass in North America. One of its large outlets is the Athabasca Glacier which provides water to communities across Western North America. Because of a warming climate the glacier has been melting and receding, losing half of its volume and retreating more than 1.5 metres per year.

Examples like this abound around the world, whether glaciers in Canada or the recession of seagrasses in our Gulf. Minimising the effects of these changes will be necessary if we are to care for the world's fragile environment.

Rob Bosley

Contents

Friends of Gulf St Vincent Forum

The Health of the Gulf - Threats and Opportunities
28th October 2012

Our Forum at the end of October was held in the brand new Port Noarlunga Surf Life Saving Club premises adjoining the jetty and right on the beach. What a location! The view is spectacular, and it was a perfect setting to hear the latest information about some of our pressing gulf issues. The talks are summarised here, but some of the talks will be produced in full as fact sheets and will be available on the Friends' new website soon.

Rob Bosley – President of the friends of Gulf St Vincent

We acknowledge the Kaurna People who are the original custodians of the land on which we are holding this Forum.

Their Dreaming Story is that Tjilbruke, the Ibis Man visited this site twice on his famous journey along this coast.

Associated with Tjilbruke is another Dreaming Story about Mullawirrabirka, the caretaker of the sea and seafront. One day he came here and saw the fish and thought that they would be good food for his people. He decided to throw his boomerang then he picked up his spear and threw it into the sea.

This made the Port Noarlunga and Horseshoe Reefs - so we could say that the very first marine park was created on this very spot. In doing so it could be said that he created the first marine park that was easily defined by the reef and the shore.

Then came the Europeans!

The first recorded explorer to set foot on land at Port Noarlunga was Captain Collet Barker. He came ashore on the 15th April 1831, discovered the Onkaparinga River and then set out inland with his party, they trekked to the top of Mount Lofty, in the process giving an account of the Adelaide Plains that would become influential in the siting of the City of Adelaide, and I guess also the changes to the environment since then.

In 1839 an 80 acre section at Port Noarlunga was bought by an Irish lawyer, George Heppenstal. George established the Noarlunga Fishery in the early months of 1841. The station employed 25 men and they had 2 catchboats. The records in the State Library show that the rowdy nature of the fishermen and the extent of smuggling in the area figured prominently in the Police correspondence of the day.

George constructed the first permanent structure on Witton Bluff, which he named "Whaleview" as he held the whaling rights for Gulf St Vincent. Unfortunately for George the only whale recorded was a dead one washed up on Aldinga Beach that was subsequently seized by the Police. A lengthy legal argument ensued to determine if his license for fishing covered a dead whale. All this time the carcass was decaying and poor George then had the task of removal at considerable expense. (He would have been more successful this year as 2 whales were seen off the Bluff.)

However more recent records show fishing was good and indicate big catches all along the coast. Certainly today's fishermen would be envious.

So the question is whether the health of the coast has got better or worse.

Specifically here at Port Noarlunga, which is an existing Aquatic Reserve, it will be overlaid with a Sanctuary Zone, a Habitat Protection Zone and Special Purpose Area – particularly off the jetty. This may be confusing!

So we come to today's Forum presented by the Friends of Gulf St Vincent, and just like Mullawirrabirka we see our role as caretakers of the gulf and shoreline.

The dictionary has two definitions of a gulf: besides our use today as "a wide body of water", it also has the meaning of "a wide difference of opinions".

The theme of this Forum "The Health of the gulf – Threats and Opportunities" and the intent with the impressive lineup of speakers is to "bridge that gulf".

Tim Kildea - Adelaide Desal Project

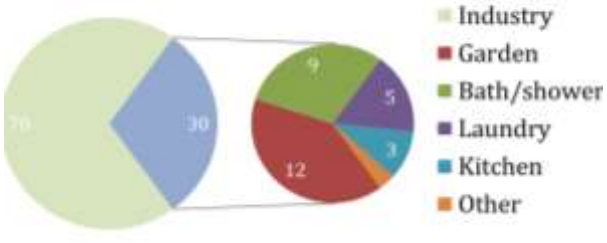
Marine Environment Manager, Adelaide Desalination Project, SA Water

No one was expecting to build a desalination plant at Adelaide, but there were plans for one at Tumby Bay. The local reservoir had become salty, and SA Water was looking at desal as a way of making the water useable. Tim's interest was in the impacts associated with discharging brine from the desal plant onto seagrass beds. He raised a few questions about this potential problem, and that led to his involvement with the Adelaide Desal Plant, when he was asked to write a paper on the siting of a desal plant along the Metro coast

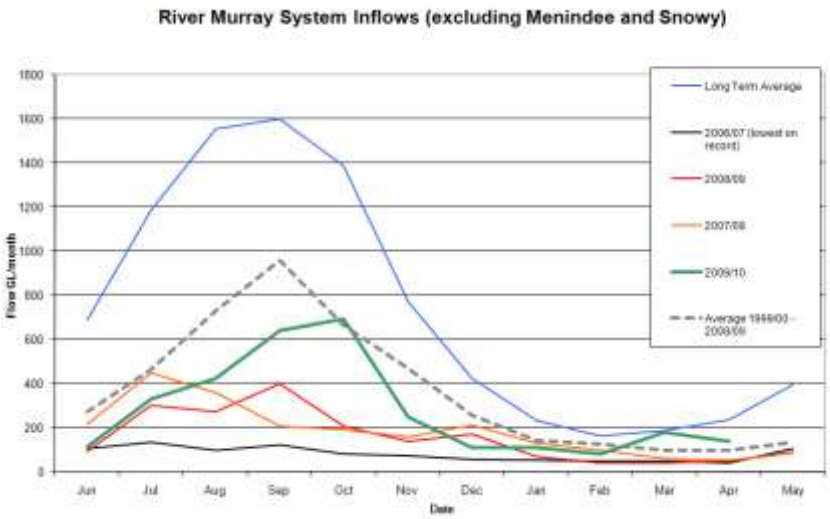
The Adelaide Desal Plant has now been operating on and off since September 2011 during the commission phase, and a significant amount of data has been accumulated.

Adelaide's water supply comes from catchment storages and the River Murray. In an average year we get 60% from catchments and 40% from the Murray.

Water supplied by SA Water is treated to drinking standard, no matter what it is used for. Adelaide uses about 200 GL each year, and only around 3% is consumed.



Poor water quality is a particular consequence of low flows in the Murray. During the severe drought in 2006-7, when flows were the lowest on record, there were algal blooms and high salinity, and for the first time ever, salty water was pushed up from the Lower Lakes as far as Murray Bridge and Tailem Bend. Adelaide was in serious trouble. Reservoirs were also critically low. That led to a whole lot of issues.



Why build a Desal Plant?

Desalination plants are costly, and not an investment decision made lightly, but in 2003 a committee was formed to consider how water could be supplied to Adelaide if the flow down the Murray stayed so low. In 2006-07, with about 7 months storage left in our reservoirs, it was a very serious situation. This triggered the rapid development of a Desal Plant.

Peter Cullen, Adelaide Thinker in Residence in 2004, analysed Adelaide's options for water security. They included increasing the capacity of reservoirs, increasing water price and reusing water. There were significant issues with all of those options.

Desalination is the only rainfall-independent source of water.

What are the known risks?

In desal plants overseas, the main problem seemed to be **entrapment** and **entrainment**. It was essential to consider any issues that could arise – however unlikely. For example, calculations were made to ensure that the intake structure could withstand the force of a whale rubbing itself against the seawater intake. Whales have been known to swim up against the Port Stanvac jetty to scrape off barnacles.

Saline concentrate is considered the highest risk.

Another issue is **nutrients**. The plant takes in seawater containing nutrients, which is concentrated and discharged. Overseas, red tides near outfalls necessitate halting intake.

Dissolved oxygen was picked up as a particular issue by the media ie, a death plume forming on the sea floor that kills everything.

To address all of the issues above, some key environmental drivers emerged.

The first was **minimising disturbance** to sensitive areas/habitats, specifically the protection of coastal cliffs, intertidal and sub-tidal reefs near Pt Stanvac.

The second was **minimising entrapment and entrainment** of organisms through the intake. Designers have been able to reduce the speed of water entering into the seawater intake, and hence the risk of marine life being sucked in. The analogy was given of a bath outlet. If it is small, the flow is stronger than if the outlet is wide. The goal was to achieve an intake velocity of less than 0.15 m/s (the average current speed offshore at Port Stanvac). The other strategy was to locate the intake in deep water away from reefs and nursery grounds.

The final challenge was **managing the marine discharge**. There were many caveats, including a dilution of at least 50:1, but more important was to ensure there was no impact of the concentrated saline on the seabed.

A large number of monitoring studies (>28) were conducted in the Pt Stanvac region to build a thorough profile. Tim did about 300 dives across the whole site, most of which is bare sand.

The studies being conducted

- Offshore salinity sensors
- Current profiles
- Subtidal and intertidal reefs surveys – compiling a database of species recorded
- Plankton surveys
- Infauna (bugs that live in the sand)/ meiofauna (organisms <50 microns) surveys – had not been done before in GSV or SA
- Baited remote underwater videos
- Water quality profiles – dissolved oxygen, chlorophyll, pH temperature etc and seasonal variability
- Ecotoxicity tests (on chemicals to be used in the Plant)
- Diffuser validation
- Intake/outfall water quality monitoring

Background data were collected for 2 years before operation commenced, and there is now a very good core database with which to compare data after the plant began operation.

Data

Saline concentrate is probably the most toxic chemical or issue that we have to deal with. Dispersion of saline concentrate is critical in minimising impact on reefs or the seabed.

The aim is to push saline water into the water column as quickly as possible for rapid dilution, so that when it reaches the seabed it is close to normal salinity. This design challenge was achieved by using a duck-billed valve made of rubber, which opens with the pressure of water behind it, and maintains a consistent brine water plume velocity.

Duck bill valve

Modelling was required to validate that adequate dilution was being achieved as part of the licence condition. Plant performance has been better than expected. It extracts 48.5% water from seawater, therefore more dilution is required.

Salinity offshore in the Port Stanvac region is not constant, varying from 35-36 parts per thousand (ppt) to 38 ppt. Levels can reach 40 ppt up the Gulf, and this makes modeling more difficult. It was necessary to determine how far above ambient the levels were when the plume hits the sea floor.

An output of 300 megalitres of fresh water per day generates about the same quantity of saline at 70 ppt (70 grams per litre). By the time it hits the sea floor it is at 36.6 ppt. On the sea floor around the diffuser the salinity is about 0.6 ppt above ambient. The footprint of

the plume shows that at 500 metres the salinity is down to 36.0 ppt locally, but further away it is back to ambient. The diffuser has been shown to work. It is expected that there will be similar normal variations seasonally, but the important result is how far above ambient the levels are.

Dissolved Oxygen data shows that, 50 metres from the diffuser, concentrations are between 6.5 – 9 mg/L. The SA water quality policy says we need > 6 mg/L for a healthy ecosystem. Generally O_2 concentration in this area ranges between 7.5 at height of summer to 9 in winter. Oxygen saturation depends on temperature and good oxygen levels are being recorded – there is no death plume as yet.

Construction of the Plant

Dredging and drilling offshore was required to sink six steel pipe casings (2.5 metre diameter) into the sea floor at a depth of 20 metres.

All of the dredge and drill spoil was pumped onto a barge nearby, which had a water treatment plant on board. The spoil was processed to a level at which it had no colour before returning it to the gulf waters. As far as is known, that hasn't been done anywhere else in the world and it was very impressive that the dredgers achieved what they set out to. About 4200 cubic metres of spoil was treated, and the background turbidity during dredging didn't exceed 2 NTU. The dewatered dredge spoil was taken ashore and used as fill, and there was no impact on surrounding sensitive areas. SA Water monitored water quality 24/7. It was not a cheap process!

Groundwater also had to be managed. The same treatment process that was used for the dredging offshore was used on land during construction of the Plant.

Because of the history of site use at Port Stanvac it was necessary to be very careful with re-injection because of the likelihood of high levels of heavy metals and hydrocarbons. The contractors put in a number of treatment plants that extracted the heavy metals, managed the turbidity and removed hydrocarbons. Because it was a construction site it was also necessary to avoid stormwater runoff from the site. In the end the contractors treated 830 megalitres of water and of that 520 was re-injected back into the aquifer and 310 was discharged into the Gulf.

About 250,000 native plants were planted on the site, all local species, with some of them quite rare. They will now provide a seed bank for future propagation and distribution.

At the start of the project there was a plume from an accidental release of stormwater, so all stormwater was also subsequently treated. A wetland was developed on the desal site to filter the stormwater and minimise runoff and pollution. Mobil Creek, which was one big earth drain when the project began, has also been rehabilitated with natives.

An excellent paper has been published in *Water Research* (authors – Roberts et al) which reviewed all the literature relating to desalination plants in peer reviewed journals. Over 40% are review articles, listing the same issues, 10 % are monitoring studies. Of all the plants operating around Australia there have been no issues, but very few are actually conducting ecological field experiments. SA Water is compiling a database of the studies and the information collected – both before the plant began operating and now when it is operational, and this will enable the publication of some significant results.

So far, from all of the information collected, and published on the EPA website, no environmental impact has been detected.

It has also been a big surprise how quickly a large variety of fish have colonised the "reef" – the rock armour around the diffuser – we seem to have a new little marine park at Port Stanvac

The plant has 2 years of warranty, and will operate at capacity of anywhere between 0-100%. At the end of two years it will be on standby. At the rate we are going this year, the reservoirs are at about 60%, which is less than anticipated (70-90%) Rainfall in the past couple of months has not topped up the reservoirs.

There have been some unforeseen benefits of having the ADP. Desalinated water has been used while Happy Valley reservoir was taken off line during treatment with copper sulphate for a potentially toxic algal bloom. There are likely to be other such benefits.

Water quality studies will be ongoing for at least the next year particularly to gain better understanding of what is 'natural' variation in water parameters in the Gulf.

Gerard Hocking - Dredging and Earthworks Drainage

Gerard is Senior Environmental Advisor at the EPA SA, with 15 years experience in environmental regulation, including earthworks drainage and dredging.

The current dredging and earthworks drainage guidelines document was originally created from the Environment Protection (Marine) Policy 1994. This guideline was updated in June 2010, to remove references to repealed legislation only.

The EPA is now reviewing the guideline more broadly to ensure that it properly reflects the EPA position on dredging and earthworks drainage. The review has begun, and should be finished by March 2013.

The timing allows consultation with community groups, licensees, companies that carry out dredging & others with an interest in dredging or earthworks drainage.

Dredging is a prescribed activity of environmental significance under the Environment Protection Act, which means that a licence is required to do it.

The formal definition of dredging is 'removing solid matter from the bed of any marine waters or inland waters by any digging or suction apparatus, but excluding works carried out for the establishment of a visual aid to navigation and any lawful fishing or recreational activity'.

The review will consider both marine and inland dredging, which gives the EPA (regulatorily) more hassles than marine dredging. When considering inland issues it may not always be clear that dredging is proposed, rather than just digging. It may be necessary to work out whether a licence is required, and then how to carry out the work in an environmentally sensitive area.

Earthworks Drainage is 'the conduct of earthworks operations in the course of which more than 100 Kilolitres of waste water containing suspended solids in a concentration exceeding 25 milligrams per litre is discharged directly or indirectly to marine waters or inland waters'.

The Desal Plant is a good example – they had an earthworks drainage licence because there was extensive work on land, together with stormwater to manage on a big construction

Adelaide Desalination Plant dewatering pit

site. They had a dewatering pit – the large

underground shafts were collecting 16 Litres per second, which had to be dealt with. Earthworks drainage is about control and discharge to minimise impacts as far as possible.

The Southern Expressway is another example of a major earthworks drainage project that EPA is monitoring, as is the Superway at Dry Creek – long term projects that have experienced rainfall events where there is significant stormwater runoff containing a complex of suspended solids and other pollutants to be managed. The SA Water Quality Policy dictates what can be discharged from these sites.

Definitions from the Act

Water

- water occurring naturally above ground or under the ground
- water introduced to an aquifer or other area under the ground
- an artificially created body of water or stream that is for public use or enjoyment

Marine waters

the coastal waters of the State or any part of the sea that is within the limits of the State, and includes any estuary or tidal waters. Once you get down past Kangaroo Island the limit is 3 nautical miles offshore.

Types of Dredge

Cutter suction dredges are used in SA to dredge a wharf or a channel. The cutter head churns up the seabed and sucks it in and sends it back out through a pipe.

The Glenelg dredge is mostly based at

Holdfast Shores, because it requires frequent dredging.

There is also a dredge with digging apparatus, this one shown has a long reach digging excavator and is creating new berths at North Haven.

There are a few points to make:

- Guidelines are not legislation. They cannot direct what is to be done, but outlines the EPA position on what is expected to comply with the legislation. We try not to be too proscriptive, but give measurable outcomes, such as minimal turbidity levels and disturbance – which is difficult to avoid when dredging. There will be turbidity with dredging, but usually it will be for a short time.
- In order to do dredging you need a licence - there can be licence conditions imposed to carry it out in a particular way if there are good reasons to. This is not the usual case, to avoid hampering the job if it is being done in an environmentally sensitive way. The rest of the Act applies, General Environmental Duty is quite a powerful measure, and the Water Quality Policy applies, although there are grey areas. The guideline sets out the EPA's expectations. If a licensee wants to deviate from that they can, if they can justify a better method.
- EPA has not prosecuted anyone for breach of a dredging licence, however the Desal Plant incident is under investigation, and should be resolved by the end of the year (it has been three years so far). It will most likely not result in a prosecution, but there will be penalties. The details will be published on the EPA website.
- If monitoring is required, the licensee must do it or pay someone to do it. This applies for all licences. A standard licence condition is that EPA must be notified prior to the job, so that they have the opportunity to visit the site and inspect if required, but the onus is on the licensee.
- There is one company that does most, if not all marine dredging in SA, and they have a fairly good understanding of the impacts and perform monitoring quite well. If they encounter low dissolved oxygen, for example, they stop and wait.
- The dredging monitoring plan will have triggers, and if they reach those, they stop and contact EPA, who can then go to the site and assess what is going on. EPA powers allow us to stop a job. EPA has a good relationship with the dredge company, and could stop a job without having to enforce their powers.
- Practices elsewhere are not necessarily that great. The methods used at the Desal Plant are probably "world's best practice", but there is always a trade-off – in this case it was very expensive. If all dredge operations had to be carried out in this way, it would impact significantly on both commercial and recreational water vessel movement, with massive flow on effects.
- Most of the dredging in SA is small-scale dredging for marina maintenance. The channel deepening in 2005-06 was a big job, but WA, for example, has massive North-West Shelf projects, and Qld also has much larger projects.

EPA are updating the guideline, not changing legislation

The review encompasses dredging marine waters, dredging inland waters and earthworks drainage

All opinions and ideas will be considered

Submission by email to gerard.hocking@epa.sa.gov.au with **Dredging guideline review** in the subject line are preferred.

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Andrew Thomas - Water Management in the City of Onkaparinga

The journey so far

City of Onkaparinga has about 30 km of gulf frontage – about one third of the metropolitan coastline and contains (wholly or partly) nine stormwater catchments.

Sturt River and **Patawalonga** basin catchments are shared with Cities of Marion and Holdfast Bay. A fair amount of work has been done to improve SW quality in that basin – the Warraparinga wetland installed by the Patawalonga Catchment Board in the late 90s. There is also a small project at Coromandel Valley, the Frank Smith wetland, along with the big sedimentation basin on the Sturt flood control dam. So already a fair bit of investment in trying to improve the quality of the water flowing out to sea, along with the huge trash racks on lower Sturt River.

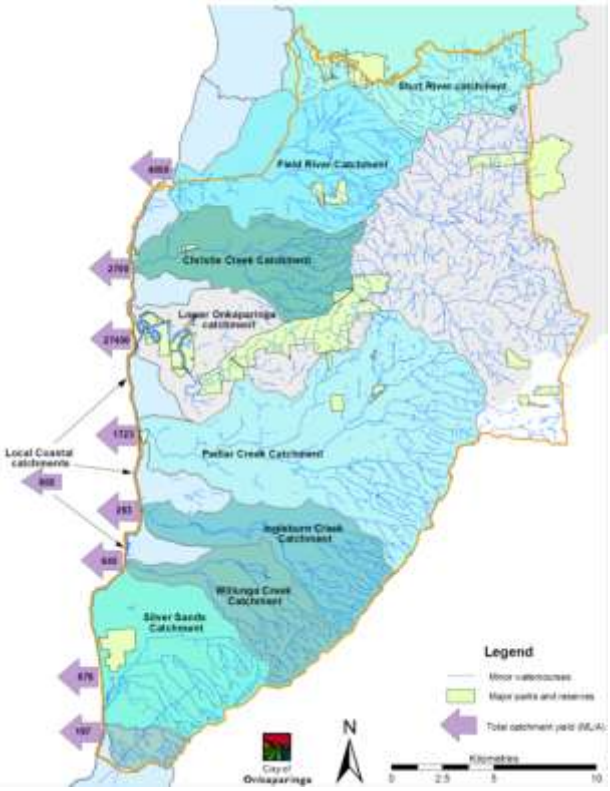
Field River, mostly within the area but also shared with the City of Marion. A waterproofing the South Stage 2 Project on Byards Road, is quite a substantial water harvesting wetland which should make quite a difference to water quality and total flow into the gulf. A significant investment and part of a $30M scheme.

The City of Onkaparinga encompasses the lower half of the **Onkaparinga River**. The construction of 5 stormwater wetlands on the Onkaparinga floodplain in the 90s has made a vast difference to the quality of water coming into the Lower Onkaparinga. That was a State Government initiative.

Christie Creek is wholly within the Council area, and until a couple of years ago, not much work had been done. A State Government task force was set up to look at it, got a Federal grant ($15M) to build a major water harvesting scheme, which is operating and capable of harvesting up to 1GL of water per year and distributing it via network of pipes both within and outside the catchment, greatly reducing sediment and nutrients flowing into the gulf.

Pedler Creek is a largely rural catchment, but substantial investment is being made as part of Waterproofing the South Stage 2 – a major water harvesting wetland is being constructed to build on the existing wetland on the site, which will allow significant water harvesting and supply non potable water for the region. It also reduces the sediment and nutrient loads coming into Pedler Creek and then the gulf.

Further south are **Ingleburn Creek**, **Willunga Creek**, **SilverSands** and the **Washpool**. There is no major activity in those catchments at the moment, primarily because they are not heavily urbanised.



The **Aldinga** development discharges into the Silver Sands and Washpool area, so the wetland is dealing with all of the stormwater from the Sunday and Bayswater estates. It's also the site of an enhancement in the Waterproofing the South strategy, with an additional pond that will capture 100 ML of water per annum, for local use. We have already seen some improvements in the Aldinga Scrub as a result of the improved hydrology associated with the project. So yet another site where water quality has improved and sediment and nitrogen loads reduced.

Three years ago a $3M investment at Sellicks Creek began, where there was a significantly eroded ravine, infested with woody weeds. It is now quite an asset for the local community.

Where are we in that journey to a water sensitive city?

Originally, when cities were laid out, the focus was on water supply, and that is reflected in legislation in the 1880s – the Water Works Act, which ensured that every property had access

After Brown et al(2008)

to clean water. Then the Adelaide Sewers Act was introduced to protect public health via sewers and sewage disposal. Flood protection became more of a problem as we became more urbanised in the 'Sewered City'. We had major drainage works under the Metropolitan Drainage Act, and a perfect example is the construction of the Sturt River Channel (which was not necessarily a good idea). That was the goal at the time in the 'Drained City' – to get stormwater out of the way because it was causing problems.

Communities came to expect social amenities, and environmental protection. The 'Waterways City', had developments like the Torrens Linear Park, and Planning legislation acknowledging that it was a good idea to have open space along water courses.

Now we are moving into a water conservation mode, a 'Water Cycle City' where we have stormwater harvesting and effluent reuse. The Water Resources Act of 1997 spelt that out in terms of making opportunities available.

So where next? A fully integrated water system is a 'Water Sensitive City'. We are not there at the moment. *Water for Good* talks about it, but there is no legislation in place – probably the closest we have is the new Water Act, which opens up a market for water utilities. But in terms of an evolution this reflects how we have settled our society, and most of us expect that we are heading in this direction.

The City of Onkaparinga is on this journey – our water supply system is completely established and networked, with a potable water supply. The city is fully sewered, except for a couple of outliers that still have septic tank systems. 150 km of stormwater drains across the city, provide flood protection and flood relief across the city.

We have some major creeks running through the city, so our planning legislation, development plan and focus has been on providing linear parks and green spaces, and development controls along the watercourses.

Onkaparinga is well and truly a water cycle city – with the Field River Water Harvesting Scheme, Christies Creek project, the reuse of effluent from Christies Beach Wastewater Treatment Plant and other water harvesting projects. The Willunga Basin Water Company are using the CB effluent to irrigate vineyards. We are looking at it far more holistically - how we are using water and what for.

But have we made it to a water sensitive city? Probably not quite there yet, but I think we are heading in the right direction.

There is good news. The City's Community Plan 2028 sets out Strategic Directions within a set of guiding policies and frameworks. The development plan is starting to pick up on the notion of Water Sensitive Urban Design (WSUD). When the community was asked the big questions about what they wanted Council to do, the environment was the one that scored highest – more important than planning, vitality and connection, the economy and leadership.

People identified reusing water, improving water conservation, protecting water quality, protecting native vegetation, preparing for climate change and creating low greenhouse gas emission cities. They were all scoring 95% in community attitudes about where we should be investing and where we should be heading.

The results fed into the City of Onkaparinga Water Futures, a water management strategy document to specifically deal with the water management aspects of the Community Development Plan, and set ourselves goals – sustainable management, water resources and security of supply. So its not just flood management, water quality improvement, water reuse – its sustainable management of water resources. Underlying that is water conservation, protection of water quality, reducing River Murray reliance, protecting ecosystems and promoting economic

development. We don't want businesses to go broke, but want something that is financially sustainable.

New capital works include water quality treatment projects, such as converting surplus road reserves to put in a biofilter and detention basin, improving flood management and water quality, and planting the area to enhance biodiversity. Hart Road wetland achieves a multiple set of outcomes including water harvesting, water quality improvement, biodiversity and amenity.

An early project at Star of Greece carpark includes biofilters to treat stormwater before it flows into Willunga Creek.

Projects now have this awareness embedded in them from the start rather than being add-ons. When deciding about stormwater management works we refer to the schedule to make sure that we deal with water quality, biodiversity, amenity, as well as flood protection. Biofilters and other measures also slow down stormwater, and stop it rushing off carparks and down drains.

Permeable pavers are another strategy being used. Stormwater soaks through pavers and collects in pits for use for oval irrigation.

There are some challenges. Projects are underway in most catchments, but there are a few small local catchments that discharge straight into the sea. They are a real problem to us. Over the last five years we have installed gross pollutant traps, which will not fix the problem, but will help.

The Beach Road catchment has a major stormwater network that discharges via a couple of massive pipes under the new boardwalk at the end of Beach Road. The gross pollutant trap fills up pretty quickly. We are looking at options for that catchment, knowing that the GPT at the end is inadequate. We have done modeling to set standards for a reduction in suspended solids at 80%. The GPT is only dropping it down by 55%, so there is more work to do. In terms of phosphorus and nitrogen our standard is 45% reduction in each, and we have not reached that yet.

The difficulty is compounded as the city moves to medium density housing. We have gone from an area that is predominantly greenfield residential development (quarter acre blocks) to an increasing trend of infill residential allotments, targeting those medium density residential zones.

This poses some problems, particularly as 27% of the urban area is zoned for medium density residential. The implications for stormwater are a much higher proportion of impervious surfaces, and more water runoff at greater speed. In a standard residential home layout on a block size of 500 m^2, the average impervious area is 38% - only about 40% is hard surface area and the other 60% is earth, where there will be infiltration and a slowing down of the rainwater runoff.

In older style medium density we go up to 30 dwellings per hectare, an average block size of 300 m^2, and 80% hard surface – so only 20% of garden to soak up the rain. At 40 dwellings per hectare (247 m^2 per dwelling) the impervious cover is 90%. Some areas allow 86 dwellings per hectare = 96% cover. Multiplied across 27% of the council area, particularly where there are existing issues in the catchment, for flooding potential, there is already the possibility, with a major rain event, of greater potential for local flooding.

There are real issues to deal with, not just with water quality management, but also from a flood management perspective. There are some challenges ahead of us, but in the City of Onkaparinga we are trying to grapple with that. WSUD is one strategy, but there is a cost associated with it. Andrew went on an international WSUD tour in 2008 and they visited Portland in the US, which is leading the way in the US in WSUD and Development.

A new residential development had an old pipe drain through the allotment, which was ripped out and replaced with a riparian corridor. Car parking was permeable paving. The residences were high density – 700 dwellings per hectare, but they have green roofs – soil and gardens are on the top – which requires stronger support underneath, but means rainwater is treated on the roof and there is less polluted runoff. Other benefits include more biodiversity.

Rainwater tank retention systems went out of fashion, but will most likely be back.

The glass is half full – we know what the issues are, and are looking at new and developing options. Our service standard for stormwater states that we want to protect from flooding but also improve water quality. We are looking closely at our requirements for retention on properties, whether to be used on site or trickling off site after 24 hrs.

Sean Connell - Living on the Edge

Professor at the School of Earth and Environmental Sciences at the University of Adelaide.

Sean's work is to interface the effects of fishing, water pollution and climate change, and forecast how our habitats will perform into the future. This means trying to understand how what take out of the water and what we add to the water influences changing habitats.

As a Masters student in northern New Zealand Sean investigated kelp forest loss. It was discovered that excessive crayfishing led to a decrease in these carnivores (crayfish) – which ate large numbers of sea urchins and other invertebrate grazers, and led to the loss of kelp forests right up and down the coast.

This loss was reversed during Sean's time, after a marine reserve was declared and there was a 20% increase in these carnivores.

While our science was firmly based on how humans have affected the planet we didn't understand nature at all. A decline in sea urchins brought back the kelp forests. This model worked well in NZ, and on the east coast of Australia and in the tropics, but it doesn't work here in South Australia.

What happens here is that with increased nutrients, algal turfs increase, eventually just dominating the bottom, so that when the kelp plants recruit they can't find a stable place on the bottom, and they attach to these little turf sippets which detach and waft up into the water column. Sean's laboratory demonstrated that if the turf can be removed, we can bring back the kelp forests. Doug Fotheringham from Patricia von Baumgarten's group has been able to show that with improved water quality we can increase seagrass cover.

Sean's quandary with all this, along with scientists from around the world working on kelp forests and seagrasses, is to understand where water pollution and fishing and are important. In South Australia both are important – but we are at one end of the spectrum where nutrients are disproportionately more important. As we add nutrients into the water column seagrasses become covered in epiphytes, turbidity increases and we see loss of seagrass.

One of Sean's PhD students has been looking at nutrients in stormwater off different catchment types up and down the coast. The results show that after rainfall on urban areas nutrients are very high – often exceeding EPA guidelines. We can trace back the blooms and find that the majority of damage was caused by sewage uptake. Looking at loss up and down the coast (using data going back many years) shows a certain form of N drives this.

The key thing is as N loads are elevated, seagrasses tend to enjoy a certain increase until a threshold, at which they crash. This explains the hectares of loss across the coast. We don't know what the critical nutrient concentrations are that do this. Sean's is the first group in the world to prove this nutrient threshold effect (new data).

Science and Policy

Anthony Cheshire and Scoresby Shepherd are outstanding contributors to marine research. Sean asked both Anthony and Scoresby under what circumstances does the science message get preserved into policy making and when are they less preserved? When does the non-science component increase?

Anthony described a phenomenon known as the Zeeman Catastrophe Machine based on his experience with a number of fisheries. As they become increasingly fished down, the people who are concerned about it – the decision makers and the fishermen – believe that by improving the environment in some way/s we can gradually bring them back in a more or less linear response. But for a large number of ecosystems it doesn't work that way. They decline, decline, decline and suddenly there is a collapse.

Some of the most respected scientists of coral reefs, kelp forests and seagrasses have all been able to demonstrate this. At first it was believed that our science or techniques were at fault because we were unable to predict this, despite extensive monitoring. It is only in recent years that we have realised we were dealing with a threshold effect. This makes it very difficult when you are dealing with decision makers and fishermen to convince them that action is required well before this. As scientists we often don't know how far along the line we are.

One of the challenges in communicating this to people outside SA is explaining why we have ecosystem collapse occurring when there are so few people in the state. Professors at UNSW and U of Sydney would say "Sean,

Adelaide has 1.1 million people and Sydney has more than 6 million but we do not have the wholesale loss you are seeing in Adelaide – how can this be happening?"

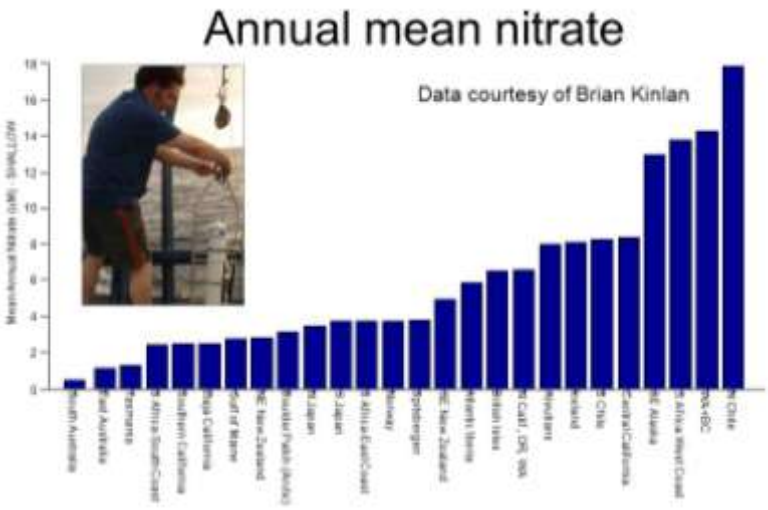
It caused such a furore that PhD students at these Unis were pulled off projects to follow up on Sean's findings and they could not reproduce the results. As a scientist that is a serious problem, suggesting that you have made a mistake in your research.

Sean spent a good few years trying to understand why people elsewhere couldn't replicate his science. What he discovered is that the East Australian current acts quite differently than the Leeuwin current. Nutrient concentration measured by chlorophyll is much higher on the east coast than the south coast.

Year after year Sean got better and better at measuring – using different types of satellite images, bought and towed a machine through the water across the Leeuwin current and diving across the coast to collect nutrients in sterile water samples at various depths.

We do have an issue. Sydney is a bit of an outlier and the currents are quite different.

We also are a global outlier. At a workshop in California people from around the world shared data and compiled a graph that shows N levels in SA are extremely low.



There is something about our coast that makes it disproportionately more sensitive to the addition of nutrients. There are few people who haven't heard that story by now. There have been some major successes with SA Water who, in conjunction with the EPA, have reduced their levels of nutrients by 35% across our coast by recycling, improved treatment technology and reusing water on parks. There is something about SA where things like water recycling doesn't seem to provoke the anger it does in other places. There is something about ours state which means we can be quite innovative.

Opportunities

Sean leads, in conjunction with the University of Massachusetts in Boston, an international project looking at the effects of climate change on coastal ecology. They have just brought the best minds from across the globe to meet in California at the National Centre for Ecological Analysis and Synthesis.

What Sean is particularly interested in is how our wastewater improvements of today will perform tomorrow? Our waters here will be warmer, they will take up more carbon and become more acidic. They way we are approaching this is by using volcanic vents in PNG and Italy (currently also seeking permission to access volcanic vents in the Bay of Plenty in NZ). CO_2 doesn't occur in easily accessible gradients across the planet, but these vents provide this facility. The CO_2 allow us to understand temperature, carbon and acidity relationship into the future.

With Stanford University and other universities around the world they have created the free ocean acidification experiment where chambers have been set up on the bottom to which can be added plants and animals to see how they perform. The are also setting up a similar experiment with SARDI, using a series of tanks to increase or decrease temperature in conjunction with CO_2, plants and animals and add nutrients to see what happens.

Sean would like to situate such a chamber off shore at the wastewater treatment plant at Glenelg to use the treated effluent, and the CO_2 that's created as a by-product, and nutrients to create a national facility for temperate Australia. It would be cheap to run and a great place to set this up to do some really good science.

One of the things Sean's lab keeps rediscovering (and it doesn't matter where the students come from, their background, gender, time of year they start their projects) is that the effects of CO_2 tend to be quite small by

themselves, the effects of temperature are a bit larger, and the effects of nutrients fall between the two. If you think you can add those elements together to understand future effects, you will be wrong each time. The effect is not additive; what we find is that it tends to be synergistic. Nutrient is insidious in some way, in that is doing something with carbon and temperature, which in combination generates synergistic responses. The good news here, for us, is that if we continue to manage our nutrients in the way we are intending to, we can actually reduce these global effects substantially. We have a great management lever from which we can actually do something about the effects of a global stressor, but on local scales. This work is very promising.

Another thing to be aware of, and Scoresby Shepherd talks about this, is that the root system in seagrasses is extensive, large and sometimes a thousand years old and a great way to capture carbon. How do the seagrasses out here act as a carbon capture mechanism? Unfortunately, due to seagrass losses that occurred globally in the 1980s the capacity for carbon capture has been diminished, and now will only provide small benefits.

Science, Policy and the media

What has Sean learnt with biology and the sorts of benefits this has brought to the coast? The Marine Parks planning process has been an ongoing story for nearly ten years now, and has involved a lot of thinking and science, lots of local advisory groups, has gone to public consultation and through cabinet to implementation. It hasn't run as smoothly as hoped, and it is interesting to ponder the role of media reporting.

"Media are entrusted to critically inform the public and provide a platform for expression of their anxieties, wants and opinions, so that citizens can participate in and thus enhance democracy.

We entrust journalism, as a profession, with the power to define the reality and interpret meaning free of personal and economic inspiration." *Brants and Bardoel 2006*

That's what we would hope.

Rick Davies, who was a reporter of the year, and works in the UK, has written a great book in which he talks about the ten commercial principles governing news:

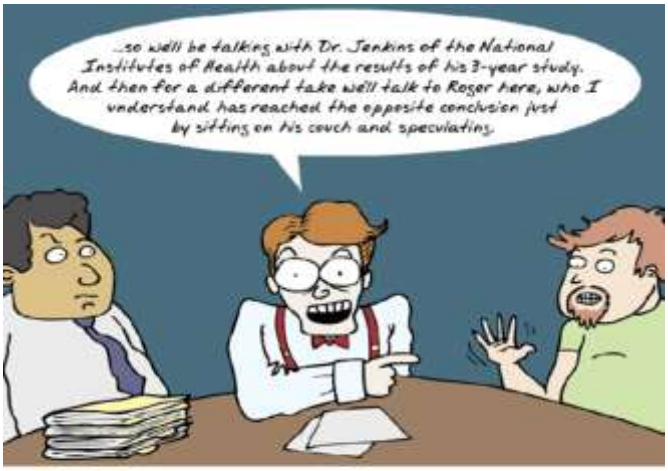
- Run cheap stories
- Select safe facts
- Avoid offending powerful interests & common society assumptions
- Select safe ideas
- Publish both sides of the story
- Give consumers what they want
- Ignore the truth if it does not fit the story
- Give consumers what they want to believe
- Go with moral panic
- Run what everyone else is running

This is spot on for how marine parks were reported in South Australia.

If we revisit the least offensive item on this list – publish both sides of the story – there are two examples given of false balance – something scientists regularly encounter.

Expert vs non-expert is an example of giving credibility to an opinion not supported by science in any way, but by speculation.

Imagine that someone like Sean, who works with an annual marine research budget of $1M with a team of 20 people, who presents findings of a 3-5 year project and then Roger comes along and has a conflicting opinion and gets equal air time. This is false balance.



False Balance

A mathematician has spent his lifetime working out that 2+2=4, but through vox pop, the person on the street, disagrees and says it is 5. This means that the listener has to decide if he true answer is 4 or 5, and most of us end up thinking it is somewhere in between. In this case journalists present an issue as being more balanced between opposing viewpoints than the evidence actually supports.

When challenged about this media people claim this is how they are trained – to present both sides of the argument. When the Icelandic volcano blew, it caused many problems, and people were suffering, but there were no opposing sides and no one to blame. A great story, but how to cover it in that framework?

The prism that is used to report the news doesn't always work for them.

John Lloyd wrote the following quoting a British cabinet minister "*I don't feel the media report the news. They only report the news through a prism of sensation, scandal and confrontation.*

… the attacks on politicians are personal because policy isn't seen as important enough"

When it comes to stopping fishers from taking fish from the sea, that this would not be popular.

Reducing N content in our water doesn't look so controversial, and we actually had a success there. It is no surprise that with marine parks there is going to be a questionable policy success from my desk as a scientist. If the ratio of non-science is large relative to science, if I have to audit the effectiveness of marine parks I will have been compromised from my desk.

To end with this quote about politicians from Andrew Marr, journalist, "*We mock them more than ever before and report them less than ever before*".

Sean thanked the FoGSV and other groups like us for being a pain, for writing the letters and asking the questions, and playing an important role, that means that scientists know that their concerns are shared beyond their desks.

Peter Shaughnessy - Seals of Gulf St Vincent

Peter was a seal researcher for 45 years, (20 with CSIRO) and is now an Honorary Research Associate at the South Australian Museum

Seals in South Australia

Three species of seal breed In South Australia – New Zealand fur seals, which are quite abundant, Australian fur seals, which are not very abundant and Australian sea lions.

The **NZ fur seal** breeds in NZ, its sub-antarctic islands and in about 60 colonies in Australia.

In Australia there are around 110,000 animals based on estimates from annual pup numbers of about 23,100. Elsewhere in Australia they breed in southern WA, there is one breeding colony at the southern tip of Tasmania and a few small colonies in Bass Strait, and a small breeding colony on the east coast at Montague. 85% of the Australian population is in SA, with 36% at Neptune Islands and 39% at Kangaroo Island.

NZ fur seal colonies near Gulf St Vincent are on KI (9,000 pups), Neptune Islands (8,400 pups) and Liguanea Island (2,100 pups). There are no breeding colonies in Gulf St Vincent. The population size in NZ is unknown, but probably larger than here.

Their breeding season is from November to January, with the median date of birth around Christmas. Adults mate 7 days after giving birth. Mothers suckle their pups for two days then head out sea to feed, return to feed the pup onshore and so on. Females are pregnant and lactating for most of their life. The birth season is quite short, and 90% of births occur

	Period	Estimate	Trend
NZ fur seal	ca 2012	110,000	Increasing
Aust fur seal (Kirkwood et al. 2010)	2007	120,000	Stable?
Aust sea lion	2004 - 08	14,800	Increase soon?

within 34 days. Pups are born with black fur and shed it in about March–April.

NZ fur seals feed mainly offshore, so they don't get mixed up too much in fisheries. Juveniles feed over deep oceans at the sub-antarctic front and stay out there for 12 months. Adult females feed on the Continental Shelf, from the sea surface to the bottom. NZ fur seals eat mainly fish and squid, but also seabirds including penguins. They bring large catch to the surface and thrash it about to break it up.

NZ fur seals and Australian sea lions have a major haul-out site (resting place) at the Outer Harbor breakwater, and counts by Mike Bossley show an increase from fewer than 10 animals of both species in 2004 to more than 60 fur seals in the last couple of years. The largest numbers are in late August at weaning time, which fits in with what has been observed elsewhere in breeding colonies. Sea lion numbers have remained stable.

How abundance is estimated in colonies

For seal populations, estimates of abundance are directed at pups, as they are the only group ashore at one time. They are easy to recognise and handle (weigh about 8 kilos), and are born over a period of a month. A procedure called mark and capture is used in preference to counting pups which only accounts for 60-70% in large colonies.

Teams of 10 people are required – one recorder, seven clippers, one catcher, one to paint dead pups.

They walk through the colony, marking pups (clipping the hair on their heads) in late January, when the breeding males have left the colony and the pups are about 6 weeks old. An average marking rate is about 200 per hour and the process seems not to cause too much disturbance.

The next step is to determine what proportion of the pups have been marked, so they go back to re-sight and count marked and unmarked pups. Two people – the caller and recorder walk through the whole colony calling out whether the pups are marked or not. Pups are not handled, just sighted and this is repeated six or seven times, allowing a good estimate of the proportion of marked pups. From the number of pups marked and the proportion marked, an accurate estimate of pup abundance can be calculated.

Fur seal trends in KI

Counts have been conducted in two places, Cape Gantheaume at the south-eastern end Cape de Couedic in the south-western corner. There has been an eleven-fold increase in 24 years. From 1989 to 2000 the population increased by 16% each year – about as fast as a fur seal colony can grow. In 2001 there was a large dip, especially obvious at Cape Gantheaume, coinciding with a high sea surface temperature (SST) during spring in waters south of KI, on the continental shelf where the females feed. High SSTs are associated with low marine productivity, which may have caused some females to abort. Numbers recovered quite quickly in the next year. Since 2001 there have been a couple of other dips after which the numbers increased again. If the counts hadn't been conducted every year, we probably would have been unaware of some of these dips. Over the 24 year period, the rate of increase in the population has been about 11% per annum.

Why this increase in fur seal population?

This trend is occurring elsewhere – not just in SA, and in lots of fur seal species in the Southern Ocean. The best theory is recovery from overharvesting. In SA, from 1803 to 1830, about 100,000 fur seals were killed, mainly on Kangaroo Island. Breeding colonies are all now protected in some way, and there has

also been a change in attitude. Recovery was slow initially after protection began in 1919 and took a long while to pick up, becoming more rapid recently. This project began just in time. At Cape Gantheaume there were 450 pups when the project started in January 1989 and there are now well over 4000.

Implications of the population increase

Fur seals, particularly those interacting with tuna pens at Port Lincoln are not popular with fishermen. Fences designed to keep the fur seals from crawling into the pens were initially not high enough. They are now higher, but can be breached when sections fall over.

Fur seals are also being blamed for the decline of little penguins at tourist sites such as Kingscote, where artificial nests were installed to encourage penguins to stay nearby. Fur seals cruise the waters and kill the penguins. Pearson Island on the west coast has the largest colony of little penguins in SA (several thousand) and fur seals are there also, so they can survive together. A pathologist at the SA Museum has done quite a good study on the cause of death of local penguins, some from Kingscote and some from Granite Island. Motor vehicles are killers as are dogs.

Australian sea lions are an endemic species in Australia, only breeding in SA and WA in relatively small colonies. There are 76 known breeding localities, 48 of which are in SA. The population size is getting close to 15,000 and about 3,100 pups are born each cycle. The population has nominally been increasing in the last decade, but only as more colonies were found. They breed from Shark Bay and Houtman Abrolhos in WA to the Pages off Kangaroo Island. Like the fur seals, most of the sea lions are found at the eastern end of the range, with 17% at the Pages, 18% at Dangerous Reef and 5% at Kangaroo Island (40% in 3 colonies).

Sea lions are much bigger than fur seals. Adult males (bulls) can weigh 300 kg, adult females (cows) up to110 kg – twice the size of a fur seal. Sea lion pups weigh about 7 kg at birth – the same as fur seal pups. The pups are suckled for 15-18 months.

Australian sea lions have a very strange breeding system, with a 17.6 month cycle. This means it is non-seasonal, with a summer breeding season followed by a winter one. Pups are born over a long period of five or more months. Different colonies breed at different times. A spreadsheet has been compiled to help keep track of when each colony is breeding. Adult females always return to their own colony to breed, whereas some fur seals will move to different colonies.

Australian sea lions are bottom feeders and will dive to 80 metres to feed on the continental shelf. Adult females usually feed within 25 km of their colony, unlike fur seals which feed further offshore and through the water column.

Population trends at the three largest breeding sites are quite different. Dangerous Reef, the largest colony, has about 500-600 pups and the population increased (from year 2000) after Spencer Gulf was closed to commercial shark gill-net fishery. The Pages, which has about 500 pups on two islands, has a stable population. Seal Bay on KI is the important one, and we have data from there from 13 seasons that shows the population has decreased by about 0.7% per year between 1985 and 2003.

Seal entanglements in SA

At Seal Bay, most of the 1.3% of sea lions entangled were caught in shark net with 160 mm mesh size (from gill-net shark fishery). Fur seals have been found entangled in trawl net, packing tape and craypot rope and floats.

At Seal Bay on KI, the rangers and guides have collected information on seal entanglement for some years. Brad Page analysed this data, finding that most of the material found on sea lions was shark net, and we also knew this from shark fishermen who were catching sea lions, even though the industry denied it.

Derek Hamer, a University of Adelaide PhD student went on 10 shark fishing voyages (nets were set 234 times) and recorded 12 deaths. It was quite important to document this. The average incidence of sea lion by-catch was about one for every 20 net sets. Most of those

fell into the water before the sea lion could be pulled onto the deck, so the fishermen may not always have been aware of it.

Simon Goldsworthy obtained a grant from Fisheries Research and Development Corporation in 2007 for modeling work that showed that there were 256 sea lion deaths each year from shark fishery. The report was not very well received by the industry nor initially by the Australian Fisheries Management Authority (AFMA).

Shark fishery management

Shark gill nets are 4.2 km long, 3 m high and made of monofilament polypropylene. They set at the bottom, weighted with a foot rope and sit upright in the water column, floated with a headline. Sea lions most likely visit the nets to eat the gummy sharks trapped in the nets.

Simon Goldsworthy documented the problem using satellite tracking on 116 adult females from 16 colonies, to determine foraging behavior and distribution of Australian sea lions. A spatial overlap was found between sea lion foraging and shark fishing effort – both use the Continental Shelf and both use the bottom. Simon's report was published in 2010, and negotiations had begun with AFMA and the shark industry a year before the report was released.

AFMA finally agreed to put observers on boats – with about 10% coverage (one observer in every 10 voyages). AFMA found that sea lions were being caught, and so were dolphins.

Their solution was to close areas adjacent to sea lion colonies. Green areas, representing about 30% of the foraging areas of female sea lions, were closed to the shark fishery (18,500 km^2), including 6 to 10 nautical miles around sea lion colonies, red areas closed due to dolphin by-catch. The industry is permitted by-catch of 15 sea lions per year. Trigger limits were set in seven zones. They caused closure of the fishery in 18 months, and some boats are now fishing in Victoria. The outcome is that the industry is trying to fish with long lines rather than nets, as they did previously.

If, as we believe, this practice was having a significant impact on sea lion numbers, we should see more of them in future.

Other seals in SA waters

There are 36 records of southern elephant seals in SA (though not in the gulf). Their usual breeding grounds are at Macquarie Island and Heard Island. A pup was born in 1987 in the south east, and in 1932 one was born up the coast beyond Coffin Bay.

Leopard seals are more frequent (56 records). They breed on the Antarctic pack ice. There have been quite a few of them in the gulf, including one in the Port River in 1939.

We get many sub-antarctic fur seals, and many more must be overlooked because they are similar in appearance to NZ fur seals. They breed on islands in the south Indian Ocean.

The Australian fur seal, which breeds in Bass Strait, was discovered breeding on North Casuarina Island off Cape de Couedic in January 2007. That is a particularly interesting place because the number of NZ fur seal pups has gone from 500 to 200 from 1995 – 2010 and at the same time the number of Australian fur seal pups has gone up, so it looks like they are tending to displace the NZ fur seals. They also feed on the bottom like the Australian sea lions, so it is likely they are more of a hindrance to the sea lions than the NZ fur seals.

Rob Lewis - Marine Parks, reserve today, preserve forever

Rob is the Presiding Member of the South Australian Marine Parks Council and Chair of the Primary Industries Standing Committee on Fisheries and Aquaculture National Priorities Forum

The SA Marine Parks Council, comprising11 people with a cross-section of interests and expertise, advises the minister, initially on the establishment of marine parks, and then ongoing matters. Marine Parks are not about fisheries management. We have fisheries management legislation, tools and arrangements and whilst we do have some difficulties with fisheries, on a world scale, and particularly in Southern Australia ours are generally well managed.

Marine Parks are about protecting habitats and areas of conservation value to ensure that we have a representative marine system, They involve reallocation of resources. That's where the industry, social and other tensions arise, because while there are four types of zonation, one of them – sanctuary zones – will exclude industry and people from historic activities – basically a reallocation of the use of the area to another use or sector.

This has been happening in our marine resources for at least 40 years, since modern fishery management began, even something as simple as changing a bag limit is reallocating available resources.

Marine Parks will also result in an impact on some sectors, and the most vocal are the commercial and recreational fishing sectors. In the case of marine parks the government has indicated they will make appropriate, negotiated compensation.

We are conserving and putting aside areas of high conservation values under various levels of protection – using habitats as surrogates for biodiversity. The aim is to represent all habitats and thereby species, to create a CAR system (Comprehensive, Adequate, Representative) in the network of parks, at a scale such that they will be effective (whether using number of species or geographic area as the measure).

12 design principles underlying the CAR system include biophysical and community principles, to deliver triple bottom line benefits – conservation and economic, social and economic.

- Comprehensive means full range of biodiversity and ecosystems;
- Adequate means all habitats replicated at an appropriate size;
- Representative means capture all biogeographic habitats and species in the gulf;
- Priorities considered were national, regional and local.

This has not been a quick process, with considerations underway for 12 years to date. The origins go back to the 1990s, when the Australian government signed agreements to implement a national marine park system in Australia. This flowed through to the states, and the SA government introduced a Marine Parks Act in 2007.

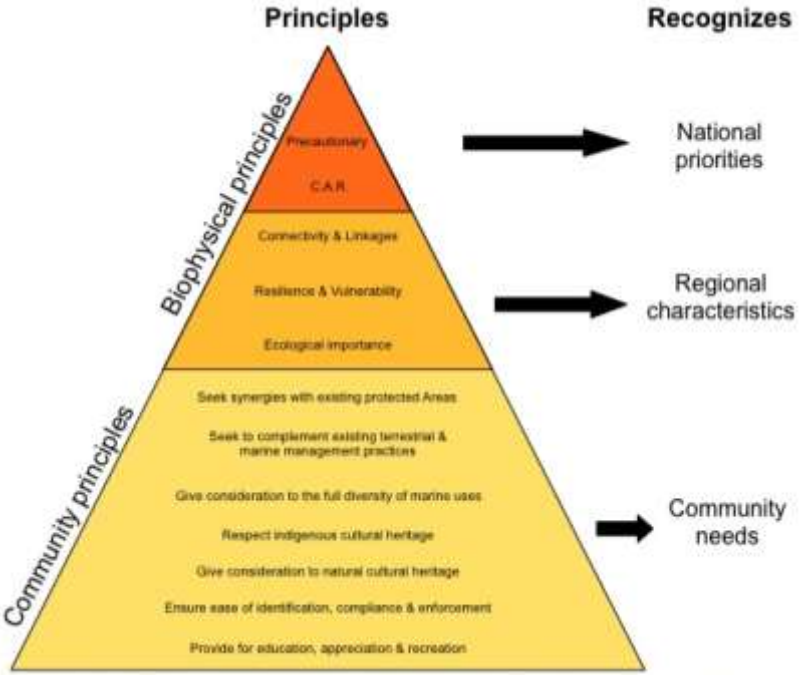
A Scientific Advisory Group, chaired by Anthony Cheshire, was formed in 2000 and has morphed into the Scientific Working Group. Over the past 12+ years there has been extensive consultation. One of the first major phases was the establishment of marine park LAGs (local area groups) for each of the proposed parks, largely a very successful process but with a few issues down the track. It involved local government, conservation groups, industry people, forming a LAG and suggesting what they thought were the most appropriate places for parks in their region. There was much goodwill, along with robust discussion and argument, but overall people did want something that addressed the marine park principles, while maintaining areas that were of particular interest to them, so achieving a balance was not always straightforward.

The outcomes of the LAG process became the foundation for all subsequent consultations. The outer boundaries were declared in 2009, and then in 2011 the draft zonation was released for public comment. This period concluded in late October 2012. The government's intention is to have the Parks implemented by the end of the year. (Note - this occurred 24 November 2012)

There have been many inputs into what is, essentially, lines on water. How do you decide where to put those lines? There were stakeholder inputs, through the LAG process, and through two public consultation phases and supported by a host of activities; in

particular the input of the Scientific Advisory Group who provided advice to the government and the Marine Parks Council.

One of the tools used was the Marxan model – the most widely used conservation planning software in the world – and a decision support tool (DSS) tool that maximises ecological benefits and minimises costs of putting in parks. The model is quite complex – it takes a series of layers of information such as habitats and coastal types, uses including fishing activities, habitats and systems, ports, other needs. It can then be run to find optimal areas, minimum zones and how they align with the 19 CAR principles to aid in making decisions.



Inside the 19 zones they have mapped General Managed Use Zones (GMUZ), Habitat Protection Zones (HPZ) - the next level up of protection, restricts some activities to protect habitats, then Sanctuary (no take) Zones (SZ), which are for conservation and passive use, (where 95% of tension and discussion between stakeholder groups has occurred) then Restricted Access Zones(RAZ) for very high conservation value areas. Protection/restriction levels become higher with each zone type.

A detailed suite of material has been produced for each of the proposed marine parks, summarising the key conservation features and values and describing exactly what can occur in each area.

In GSV there are five marine parks – Southern Spencer Gulf, Lower Yorke Peninsula, Upper Gulf St Vincent, Encounter, Western Kangaroo Island, and a range of activities that are allowed in each zone.

The outer boundaries of all 19 zones account for 44% of all SA waters, and the most contentious overall, the Sanctuary Zones, are about 6% of that. In the GSV bioregion the total area is 18,000 square km and the MP outer boundary is 5,700 square km (= 44%). The Sanctuary Zone area is 711 square km (= 6%) and the habitat protection zone makes up 4,000 (30%) and the rest is general use. In particular for the GSV region, it is noteworthy that there are no sanctuary zones along the metro coast.

The Marine Parks website has all of this information, including very extensive documentation on the development of the parks such as economic impact analyses, advice from the Scientific Working Group and SARDI on particular aspects of biodiversity, speciation, habitats and impact on fishing.

All of this up until now, 12 years in the making and thousands of column inches in papers and radio interviews, talkback and shock jocks, a huge amount of technical assessments and negotiations at the political, stakeholder and regional and scientific levels has led up to applying the principles and intent outlined in the Marine Parks Act – to provide us with a recommended system of MP in SA. We are not there yet – the government is still to make its decision on zonation and allowed activities by the end of the year. That is just the first task!

The next step is the post implementation stage, and the Marine Parks Council is now working very hard on this, particularly on strategy development in four specific areas, again assisted by the Scientific Working Group and others. These are:

Monitoring, evaluation and reporting When implementing Marine Parks it is important that they deliver benefits. This means that in 5-10 years time we should be able to assess how well they have achieved their goals. Therefore monitoring, evaluation and reporting are essential. The MP Council is determining targets to be defined, what questions need to be asked and what science needs to be done to be able to answer those questions.

Victoria is ahead of us – their parks are in place, and a review was conducted last year. The media reported that there were no benefits but the report actually says that outcomes are unclear, because monitoring and evaluation had been inadequate. We want to avoid that kind of situation.

In monitoring, evaluation and reporting, groups like FoGSV are important to provide informed, considered and direct advice in this process. We are also proposing that the government look at citizen science programs to monitor what is happening in the marine parks in the post-implementation phase.

Communication and community engagement is linked to compliance; to ensure that the appropriate activities take place and the best way to achieve that is through education and appreciation, rather than deterrence and sanctions. We have an obligation to communicate to the people who want to use these parks about what they can and can't do. This is a work in progress. Parks will be listed in statutory formats such as admiralty and marine charts, GPS and radar software. We are also looking at using social media through apps for smart phones, so that people can access that information, and also an education tool, eg if you see a blue devil when diving, you can use a marine park app to find information about blue devils.

It is also proposed the regional Marine Park Network be incorporated as a key element in future regional economies and marketing.

Discussions are underway about **management and compliance** – ie, how that can happen in conjunction with Fisheries compliance officers and other relevant departments. There is also the vexed question of resourcing the **budget** and as a consequence advice will be prepared about what can be achieved under different budgetary scenarios.

It is hoped that regional communities will support marine parks, perhaps by forming 'Friends' groups or taking some kind of stewardship role. We are looking at not only direct impacts that are usually seen as negative, but the positive outcomes for the regional economies. We are confident that there will be new opportunities for regions from the marine parks.

Marine Parks are a very complex and highly emotive arena. It is important to acknowledge that we will be reallocating some resources to other uses, but consultation, communication and appreciation of what we are trying to achieve and feedback from the community is vital in getting the message through to the government. The government has said they do want state-based network of marine parks for maximum effectiveness and future benefit. Finally, the marine parks website contains almost every document generated over the past 12 years is there along with impact statements, and detail on every park.

The intent has been to conserve representative habitats. The metropolitan coast has lost a lot of seagrass, kelp and other habitat – so it is not a pristine area – and most likely one of the factors the area wasn't targeted. Until April this year there were 135 proposed sanctuary zone regions, now there are 85. Many of the 135 zones were very small and therefore some would not have been effective because they were **too** small. As a result of discussions and considerations it came down to 85 larger proposed Sanctuary Zones – they have to be adequate.

It is inevitable that many good ideas will come out of the 8,500 submissions made to the public consultation on Marine Parks that closed on October 23rd.

Dolphin Day at Port Adelaide

20th January 2013

Marine Mammals talks by the SA Museum and the Whale and Dolphin Conservation Society

10:00am 10:30am: Ikuko Tomo, SA Museum *Recent trends n the pathology and mortality of marine mammals from Gulf St Vincent*

10:30am 11:15pm: Catherine Kemper PhD, Curator and Senior Researcher, Mammals, SA Museum *Research behind the scenes*

11:15am 12:00pm: Mike Bossley PhD AM, "Science & Education Manager, Whale & Dolphin Conservation Society (WDCS) *The Port River Dolphins*

12:00pm 12:45 pm: Peter Shaughnessy, Honorary Research Associate, SA Museum *Seals of Gulf St Vincent*

For more information:

adelaidedolphinsanctuary@sa.gov.au

SNIPPETS

New Website for Friends of Gulf St Vincent

Have you had a chance to look at the new Friends of Gulf St Vincent website yet? The address is friendsofgulfstvincent.org.au and we had made available on it a wide range of resources including past issues of the Blue Swimmer and submissions on a variety of topics.

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

Fishers for Conservation

Did you know there is a website for a group called Fishers for Conservation? This group has been going since 2005 and have posted some interesting material. One item, found when following up something on Marine Parks is worth a read. The item is titled “Marine Parks - Are we missing the point?”

http://www.ffc.org.au/Marine%20Parks%20-%20are%20we%20missing%20the%20point.html#

Contributions to the Blue Swimmer newsletter are welcome. Please send articles to: angela.gackle@bigpond.com

or leave a message on our website blog!

New Treasurer Needed

The Friends of Gulf St Vincent are looking for someone to take over the role of Treasurer on our Committee.

This (voluntary) job requires a person who can keep our financial records, maintain and update the membership list and records, manage accounts, receive and make payments as required, provide regular reports to the Committee and to funding organisations.

The Treasurer also liaises with our auditor, to provide an annual financial statement at the AGM. The business of the Friends is relatively straightforward, and the current Treasurer will be able to provide guidance in the first instance. The time commitment involved would be about one day per month.

If you are interested (or know of someone who may be) in the job, please contact John Cugley on 8289 0279 or by email john.cugley@bigpond.com

Sponsorship sought for Spencer Gulf book

The finishing touches are being made to a new publication on Spencer Gulf.

Providing the best current knowledge on the natural history of Spencer Gulf, it will be very similar to the Gulf St Vincent book of 2008, and includes chapters on history, oceanography, geology, ecology, fisheries and marine mammals.

It will cost about $40 000 to print, and corporate or other donors are sought to help get this book published.

If you know of a company or potential sponsor that would be willing to support this great endeavor, please contact Dr Steven Madigan (salmadigan@gmail.com) or Dr Scoresby Shepherd (scoresby.shepherd@sa.gov.au).