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10 Year Anniversary

Reef WATCH South Australia

Reef Watcher Production Team

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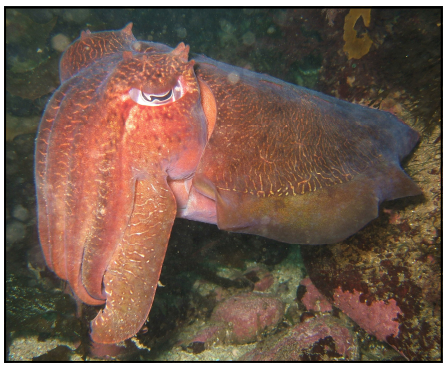
Desalination plant threatens Whyalla cuttlefish

The Conservation Council of South Australia (CCSA), the Australian Conservation Foundation (ACF) and a coalition of marine scientists have united to condemn BHP Billiton's (BHPB) proposed development of a massive desalination plant at Point Bonython in the upper Spencer Gulf. It is expected to provide 120 megalitres (ML) of water every day for the planned expansion of the Roxby Downs uranium operation. It will also produced 60 ML daily for domestic use on the Eyre Peninsula.

The plant will require about 360 ML of seawater daily, to produce 180 ML of freshwater. Billions of planktonic organisms and larvae will be sucked into the plant with few, if any, surviving the process.

The current proposal would see hypersaline water (containing up to 8000 tonnes of salt every day) pumped back into the Spence Gulf where BHPB hopes it will be dispersed by natural oceanographic processes. However, the actual amount of salt pumped into the upper Gulf may be much more, depending on demands for potable water for domestic use on Eyre Peninsula and projected future demand of an extra 80 ML for the Roxby Downs mine.

The unique marine environment in the upper Spencer Gulf is characterised by shallow water, high salinity, dodge tides and restricted water exchange with surrounding waters. This area experiences extremes of hot and cold water temperatures in summer and winter and hosts a unique community of marine species able to tolerate all these unusual conditions. The CCSA believes that natural processes are unlikely to provide sufficient mixing and that this represents an unacceptable risk of ecological damage to the unique environment of upper Spencer Gulf.



Giant Australian cuttlefish. Photo: V. Billings.

The discharged saline water will sink to the bottom of the Gulf creating a 'dead' zone of reduced and changed biological activity. Consequently, the sea floor habitat could be devastated by excessively high salt concentrations, as well as from chemicals used during the desalination process.

Marine experts believe the modelling used by BHPB to date cannot accurately predict how the constant daily discharge will interact with the naturally high salinity of the Gulf and the highly prized endemic biological communities.

According to Flinders University marine biologist, Dr Tony Bolton, "*It is difficult to think of a more inappropriate location for a desalination plant in SA. The State Government and BHPB's MOU states that the proposed plant and pipeline must be developed without material impact on the environment, especially the marine environment but it is inconceivable that a desalination plant of the scale proposed for Point Bonython can be developed without significant environmental impact.*"

ACF campaigner, David Noonan said, "*It's clear that this site has been chosen to reduce capital costs to BHPB in the length of pipline back to the mine site rather than to provide any credible environmental protection. BHPB will turn all of this water into radioactive waste at the Roxby mine.*"

Found nowhere else in the world, the massive aggregations of the iconic giant Australian cuttlefish (*Sepia apama*) occur only 200 m from the proposed outfall. CCSA, ACF and marine scientists will continue to speak out and actively lobby the State and federal Governments to ensure protection for this unique environment.

Jamnes Danenberg
Edited by Alex Gaut

Message from James Brook...

I am still involved with the Reef Watch program, but with its continued expansion and development over recent years, I am no longer able to give adequate time to the overall coordination of the program. Therefore I am now focused on assisting Steve Leske and Mark Kaehne with the training of divers and snorkelers, leaving the organisation of the broader program in their capable hands.

Thank you very much to all members of the Reef Watch community for everything that you have done to contribute to the program during my time coordinating Reef Watch activities over the past four years - including steering and other committee members, club officers, divers, snorkelers, government managers and NRM workers, scientists, and many other helpers. The enthusiasm of the volunteer base has made it a pleasure to work on this program.

Although there are many people who have made a very significant contribution over a long period of time, I would like to take this opportunity to single out Kevin Smith. Almost everyone who has dived on the program over the last five years would have been helped by Kevin, through his very thorough divemaster assistance and fantastic knowledge of fish. He has also helped the divers indirectly by making significant contributions to our dive procedures to enhance their safety and smooth running. Kevin also was the backbone of a small but persistent monitoring group at Hallett Cove whose regular data set is second in importance to Reef Watch behind only Noarlunga.

Kevin's interest in fish led him to expand his volunteer activities to work with the Inshore Fish Group (www.ifg.bioteck.org), where he has established himself as an expert in the taxonomy of Syngnathids (pipefish, seahorses and seadragons).

Unfortunately for us, it is now the waters of Western Australia which will benefit from Kevin's contributions to our understanding and conservation of marine species. Best wishes to Kevin for the new life in the west. On behalf of Reef Watch, and personally, thanks Kevin for all that you have done.

James Brook

Significant finds from the Yorke Peninsula

Reef Watch Project Officer, Steve Leske, was recently diving on the Yorke Peninsula, looking for Feral or In Peril species.

Although he found the coral *Plesiastrea versipora*, a striped pyjama squid and some leafy sea dragons, these were not his most exciting finds.

These two unusual animals were photographed by Steve at two different locations.

Steve described the green sea slug as looking like 'origami', with paper flat 'wings'. What you may be able to see if you look very closely are some tiny, iridescent blue spots dotted around the body of the animal. As yet, we have not identified it.

We sent the pipehorse picture to marine ecologist, Janine Baker, for identification. Although she cannot be sure, she thought it might be the Southern Pygmy Pipehorse (*Idiotropiscis australis* (= *Acentronura australe*)), which apparently is know from only a few records in South Australia and Western Australia. Locations where this species has been recorded include: Cape Jervis; 10 km from Troubridge Island; in south-west Gulf St Vincent and now this sighting from Edithburgh. Given the relatively few records of this species, Steve's sighting is very significant.

Work in NSW indicates that *Idiotropiscis* pipehorses are strongly site-associated and both species may be more observable at night.

Turtle has breathtaking ability

A turtle has broken a marine world record by holding its breath under water for more than 10 hours.
The loggerhead turtle was one of a number that had been tagged to establish behaviour and migration routes, when researchers realised that it had held its breath for 10 hours and 14 minutes. It was the longest dive recorded for a marine vertebrate and smashed the previous record, also by a loggerhead turtle, of 7 hours and 25 minutes. The turtle's dive far exceeds that of any other marine vertebrates. Its closest competition comes from yellow-bellied sea snakes, which have been timed diving for 3 hours and 33 minutes. Loggerhead turtles, *Caretta caretta*, can hold their breath for hours because they slow their internal systems and so need less oxygen. Researchers suggested that they were resting or sleeping under water.

Asexual shark

In a world first, a captive hammerhead shark gave birth to a pup without first having mated. The birth occurred in December 2001, but it has taken until now to verify through DNA that the pup had been produced without the input from a male shark. Further, the pup only contained half of its mothers DNA.
Although scientists had suspected that sharks could reproduce through parthenogenesis, this is the first documented case.
"Parthenogenesis has been documented in all major jawed vertebrate lineages except mammals" the researchers wrote in their report in the journal, Biology Letters.
The female shark was one of three females held in captivity for three years after capture off the Florida Keys. Until now, it was suspected that long-term captive female sharks were able to store sperm.

How much pollution do you add to the sea?

The Adelaide Coastal Waters Study (AWCS) was established in 2001 by the South Australian Environment Protection Authority.

"A significant initial focus of the study will be concerned with the quantification of nutrient inputs from terrestrial, atmospheric and groundwater sources." says the AWCS website.

The study area reaches to Port Gawler in the north, Sellicks Beach in the south and extends approximately 20 kms offshore.

In July 2006, AWCS published a technical report (no. 18) with data showing the 'volumes of inputs, their concentrations and loads received by Adelaide metropolitan coastal waters'. This report is extremely revealing - at last we have a definitive measure of the huge nutrient loads going into our metropolitan marine environments.

Stormwater was examined from the following creeks and rivers:

- Field River
- Christie Creek
- Brownhill Creek
- Sturt Creek
- Torrens River
- Christie Beach
- Patawalonga
- Onkaparinga

They also examined the output from the Bolivar, Christies and Glenelg waste water treatment plants. Not only were these input sources examined for the damaging nutrients nitrogen and phosphorous, but also for heavy metal loads (copper, lead and zinc) and for suspended solids (sediment) concentration

The results are astonishing. Table 1 shows the average heavy metal loads in five metropolitan creeks. Up to 1 kg of copper could enter the marine environment each year, which is of extreme concern. Although copper is essential to the functioning of most organisms (most marine invertebrates have copper in the blood where humans have iron), in high concentrations, or due to prolonged exposure, it is known to cause harm to marine organisms and is used in some anti-fouling paints.

The average annual total nitrogen input from the Torrens River, 1997-2004 was ~30,370 kg. Whereas the total phosphorous loading tends to be on average much lower. For example, the average annual total phosphorous input from the Sturt Creek (Anzac Highway), 1997-2004 was ~3,016 kg.

To find more information: http://www.epa.sa.gov.au/acws.html

Location	Period	Mean flow (ML/day)	Copper (mg/L)	Lead (mg/L)	Zinc (mg/L)
Torrens	1996-2005	89	0.015	0.013	0.075
Brownhill	1996-2005	32.8	0.018	0.015	0.13
Sturt	1994-2005	55.6	0.018	0.014	0.099
Field	2001-2005	9.4	0.012	0.008	0.037
Christie	2001-2005	7.67	0.011	0.009	0.055

Table 1: Comparison of mean heavy metal loads for the metropolitan creeks.

Climate Change Special

What do you know about climate change? Maybe you have seen Al Gore's movie '*An Inconvenient Truth*', maybe you have read Tim Flannery's '*The Weather Makers*', or maybe you keep abreast of the news via other sources of information. Whichever way you get your information, climate change is big news and we are living through it right now.

If you are reading this newsletter you are probably already somewhat aware of the mechanisms of climate change and therefore we are not going to repeat what you may already have seen or heard elsewhere.

However, we wish to report some of the effects of climate change that are already showing around the world in different habitats and their impacts on the organisms in those habitats, including our temperate reefs.

One of the most commonly reported effects of global climate change is the melting of glaciers. It is only the melting of land-based glaciers that will contribute to sea level rise, but most land-based glaciers will only contribute a few centimetres. It is the Greenland ice cap that will dominate sea level rise if it melts completely. It contains enough water to raise the global sea level by approximately 7.5 m! In 2004, it was discovered that this major ice store was melting ten times faster than previously estimated.

What does this mean for the Arctic environment? Arctic ice is both shrinking and thinning. It is almost half as thin as it was in 1979 and is shrinking more and more rapidly. This sea ice is extremely important habitat for polar bears. They hunt the seals that use the ice on which to breed in snow dens. However, with less and less ice, the seals are either not breeding or are having to move further away to find suitable breeding grounds and thus, polar bears are slowly starving to death. A long-term study of 1,200 bears in the Hudson Bay area revealed that they are already 15% skinnier on average than they were a few decades ago.

Morteratsch glacier, Switzerland; top, 1911; bottom, 2005.

Another Arctic animal on which climate change will have a significant impact is the humble lemming (*Dicrostonyx hudsonius*). Lemmings survive in the harsh tundra environment, so far north that even the coniferous forests cannot survive. However, the 2004 report, '*Arctic Climate Impact Assessment*', documents that with forests predicted to expand northwards to the edge of the Arctic Sea, the forests will destroy the tundra and the lemmings with it - the report predicts that they will be extinct by the end of this century.

At the opposite end of the Earth, the Antarctic shows more dramatic signs of climate change, including the collapse, in February 2002, of the Larsen B ice shelf.

Collared lemmings will be extinct by 2100.

The complex food web of the Antarctic revolves around the plentiful crustaceans known as krill. Up to 70% of the total southern hemisphere krill population resides in the Southern Ocean, but since 1976 krill have been in sharp decline, reducing at the rate of nearly 40% per decade. As krill numbers decrease, the population of 'salps' (jelly-like creatures) is increasing. Unfortunately, salps are so lacking in nutrients that none of the Antarctic's marine mammals or birds bothers feeding on them. The emperor penguin population is already half what it was 30 years ago and the number of Adelie penguins has reduced by 70%.

As for our temperate reefs, the effects could be just as devastating. An increase in sea temperature is also a factor in sea level rise due to the expansion of warm water. But some marine species cannot function outside of certain temperature parameters. A few years ago, winter sea temperatures (in SA) were warmer than average and many macroalgae species did not reproduce that year. This has major implications, given that macroalgae provide the main habitat for many different reef species and provides an essential gas exchange service.

This could be the first in a series of gradual but significant changes in temperate reef communities. So Reef Watch needs your help more than ever to document these changes via the subtidal and intertidal surveys.

Alex Gaut

Climate Change Actions

Walk Against Warming 2007

Bringing together Australians across the country for a community day of action on climate change, Walk Against Warming has been an annual event since 2005.

In 2005, around 20,000 people walked in 17 locations nationwide. This quintupled last year with almost 100,000 people taking to the streets in 28 locations across Australia!

This year, this extraordinary momentum will continue. Join hundreds of thousands of other Aussies at Walk Against Warming to send a clear message to our political leaders – that the community wants bolder and more effective government action on climate change! And we want it now!

When? 2 weeks before the Federal Election

Where? Go to the WAW website:

www.walkagainstwarming.org

More climate change on-line

The Climate Movement:
Www.climatemovement.org.au

The Big Switch:
Www.thebigswitch.org.au

Al Gore's 'An Inconvenient Truth':
www.climatecrisis.org

Intergovernmental Panel on Climate Change:
www.ipcc.ch

RealClimate:
www.realclimate.org

Australian Greenhouse Office:
www.greenhouse.gov.au

The Weather Makers:
www.theweathermakers.com

Action at home

Humane Society International has drawn up a list of actions that you can take and have estimated the amount of CO_2 saved per year by taking these actions. Here are the top ten:

Action	CO_2 saved per year (kg)
Change to GreenPower electricity	5,300
Plant native trees	2,270
Start a carpool	720
Use a clothesline instead of a dryer	640
Wrap an insulation blanket around your water heater	455
Reduce your rubbish (buy products with less packaging, buying reusable items, recycling, etc.)	455
Turn off electrical appliances when they're not in use—don't leave them in 'standby'	440
Turn off at least 5 lights in hallways and rooms not in use	400
Keep the tyres on your car fully inflated—check monthly	365
Keep the your car air filter clean—check monthly	365

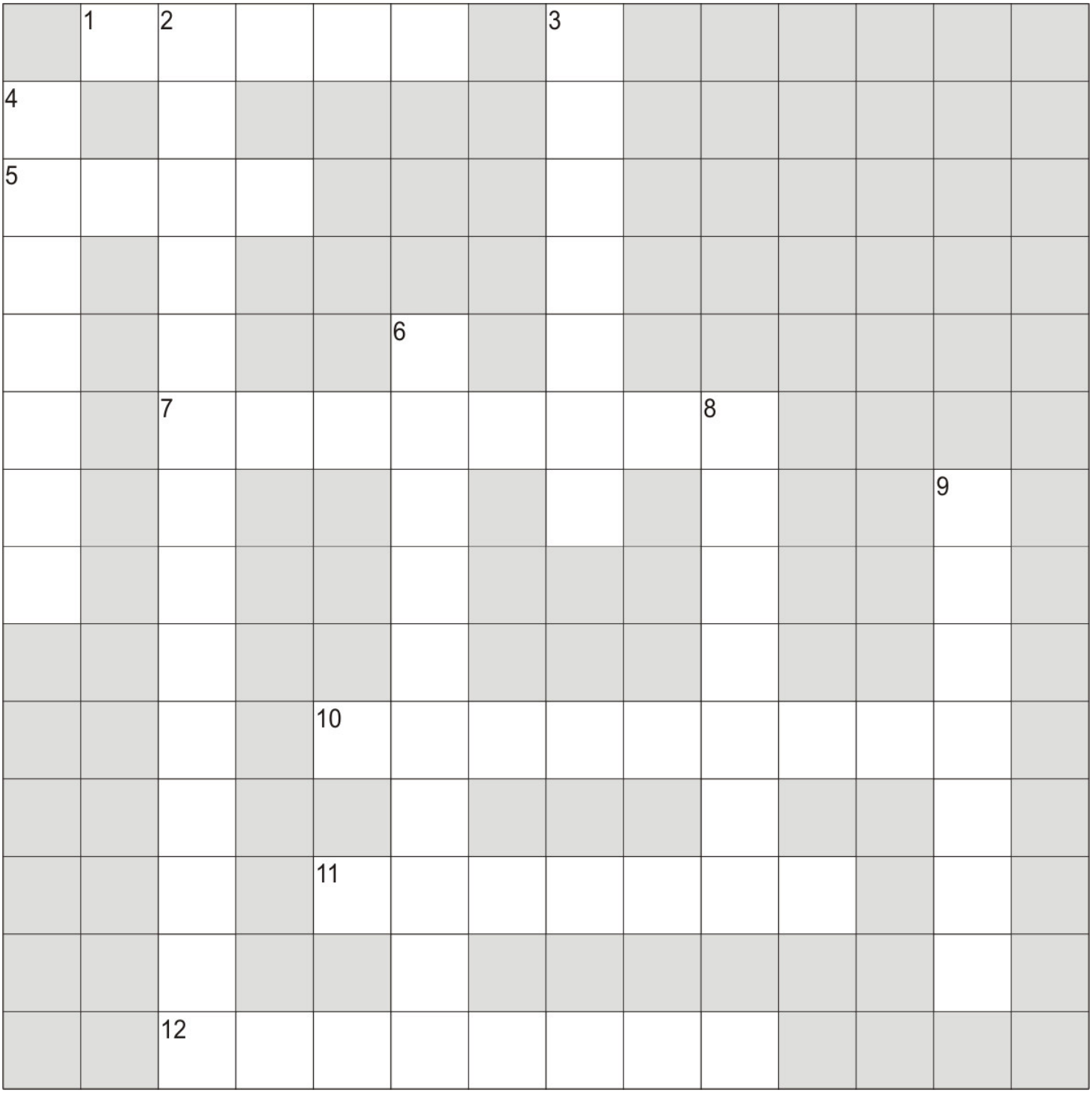
Other top tips for reducing your CO_2 output include:

- Insulate your house to save on air conditioning and heating.
- Clean the air filter in your air conditioner.
- Use public transport when possible.
- Get solar hot water.
- Change to fluorescent light globes.

If you can, go solar all the way, although this is still not a cost-effective option for most people.

If you wish to change to GreenPower, the federal Government's new accredited renewable electricity scheme, then go here: www.greenelectricitywatch.org.au This survey of many GreenPower products for homes has ranked the products according to a number of criteria. Make the change today.

Temperate Reef Crossword



Down

2. Diverse group of reef fish, very curious, with single dorsal spine
3. Simple animal, one mouth/anus, many tentacles with stings
4. Highly intelligent mollusc with no shell
6. Large, friendly predatory reef fish
8. Edible reef mollusc with 'holy' shell
9. Mollusc group with no shell, extremely colourful

Across

1. Primary producers, but might not be plants
5. Crustacean with no 'tail', very common group
7. The dominant brown alga on temperate reefs
10. Colonial animals, quite advanced
11. Basic filter feeders - all colours and shapes
12. Predators with five body parts

Reef Watch 10th Anniversary Quiz Night!

Yes, it's back! A night of fun, frivolity, fiction and fact!

The Reef Watch 10th Anniversary Quiz Night will be a night to remember! Not only will there be another sensational quiz, but we hope to have special guests, raffles and more to celebrate our 10th Anniversary.

Form a table (8-10 people) or let us find you a seat. There will be something for everyone. You do not need to be a diver, marine biologist or involved in Reef Watch.

There are many different kinds of prizes including lots of diving related gifts, wine, books and more!

Date: **Friday, 19th October**
Time: **7 for 7.30 pm**
Venue: **Reedbeds Community Centre, Fitch Road, Fulham**
(enter via Pelps Court)


Photo: Alison Eaton

Cost: **$5 ($2 unwaged)**, pay on the night
Catering: **BYO food & drinks**

To book, email: info@reefwatch.asn.au or call 8223 5155

More info: www.reefwatch.asn.au/quiznight

White Sharks Count Update

Some of you may be aware that the Marine Team started a project called 'White Sharks Count' about 18 months ago. The purpose of the project is to use sightings of white sharks by the general public to build a picture of the sharks' status and movements in local waters. This previously untapped information resource is a simple yet effective way of getting the community involved with a real conservation project.

To date, the project has received 57 reports of sightings from commercial and recreational fishers, charter boat operators and other users of Eyre Peninsula's marine environment. The project is focused around the Eyre Peninsula (EP) because this is the most common area for sightings of great whites.

Unfortunately the number and nature of the sightings is not yet enough from which to begin to draw conclusions. But as the number of sightings increases so too does the type and quality of information we can gather from them.

White sharks are protected under both Commonwealth and State legislation due to their hugely reduced numbers and extremely slow reproductive rate.

White sharks are threatened in a number of ways:

- taken as bycatch in nets and long lines. Based on anecdotal reports, estimates of annual capture range from less than 10 to 100 per annum in South Australia.
- Game fishing was carried out in at least 5 states before white sharks were protected.
- Beach meshing usually catches small sharks, with 98% under 4 m long.
- Illegal trade of shark products such as jaws, teeth and fins.

Globally, there has been a decline of white sharks between 60-95% in the last 50 years. They were listed as Vulnerable on the *IUCN Red List* and in 2004 they were protected under the *Convention on International Trade and Endangered Species of Fauna and Flora*. This means that permits are required to trade any parts of white sharks.

So, if you are over on the EP and you see a great white, **DON'T JUST TELL YOUR MATES**!

Report your sighting:

www.reefwatch.asn.au
or
Call Fishwatch: 1800 065 522

Many thanks to our generous sponsors

Reef Watch currently receives most of its funding from the Adelaide and Mt Lofty Ranges Natural Resources Management Board through the Natural Heritage Trust.

Additional support is provided by the Kangaroo Island, Eyre Peninsula, Northern and Yorke NRM Boards.

Other supporting organisations include:

- Primary Industries and Resources SA via SARDI Aquatic Sciences
- Department for Environment and Heritage
- PADI Project Aware

Reef Watch also acknowledges the generous support of the diving industry for Reef Watch events.

Government of South Australia

SARDI Research and Development Institute

Conservation Council of South Australia Inc

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Conservation Council of SA
120 Wakefield Street
Adelaide 5000
SA

Reef Watch South Australia

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More blue whales in the Great Australian Bight

Marine watchers say the endangered blue whale is returning in greater numbers to the Great Australian Bight.

Southern right whales are the main attraction of the winter whale watching season, with up to 100 of the mammals gathering annually at the Head of the Bight off the south of the Australian mainland.

Fisherman Kiwi White says blue whales are making a welcome return.

"The blue whales, it's only been the last couple of years and so it's good to see them coming back," he said.

"Some days you might see half a dozen and then they'll disappear for a week and then you might see them 50 miles away or 100 miles away."

Source: http://www.abc.net.au/news/newsitems/200706/s1951150.htm

Whale watching

Don't forget, whales are protected. Here are some simple tips to help the whales and the environment while whale watching:

- Keep off sand dunes. Dunes and dune plants are fragile.
- Keep clear of the whales in the water.
- Be quiet when whales are close.
- Respect other people's property by taking your rubbish home.
- Stay away from cliff edges.

Enjoy whale watching on the southern Fleurieu Peninsula, Kangaroo Island, Robe, Port Lincoln, Ceduna and the Head of the Bight.