MARINE Life

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Our Goal

To educate, inform, have fun and share our enjoyment of the marine world with likeminded people.

The Crew

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Cover photo, *Tony Neilson, the bar-tailed godwit*

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Cute Antarctic Fish – See more Inside

The Good News and Bad News on Greenhouse emissions

Look I know it isn't about a Senator's grandfather's citizenship but other important stuff has been happening in the news that just isn't being reported. Bad News, Australia's emissions are going up. Very Good news, everyone else's (still excessive) CO2 emission levels are stable or falling.

Source CRITICAL DECADE 2017: ACCELERATING CLIMATE ACTION climatecouncil.org.au

The Paris climate talks agreed to restrict warming to no more than 1.5 degrees, Australia's pledged to reduce emissions by 26-28 per cent by 2030.

Amongst the G20 countries, Australia's emissions reduction target – a reduction of 26-28% on a 2005 baseline "is unusually weak, nowhere near what is required for us to play our fair share in tackling climate change". At the moment we don't look like getting even there.

In 2015, the Climate Council said the government had to wean the economy off coal and fast. Energy efficiency and renewable energy were the key to meeting the Paris 2°C target, and could contribute the majority (75%) of the necessary reductions.

Now in 2017, the Climate Council reports that everywhere there has been "a seismic shift from fossil fuels to renewable energy". Solar and wind systems globally are doubling every 5.4 years. This has been accompanied by a drop in coal consumption, particularly in the US and China. In China, the volume of coal consumption has decreased by 2.9%, 3.7% and 4.7% over the last three years. Solar are wind plants are now cheaper to build than new coal-fired power stations. Reliability of new power systems is improving with the costs of battery storage systems dropping by an average of 14% per year from 2007 to 2014. The world's energy industry could eliminate greenhouse gases by 2040.

Other commentators have jumped on this as an overly optimistic statement as China has since then reported a climb in CO2 emissions as it recovers from the Global Financial Crisis (GFC).

Less promising is the transport sector. Cars, ships and airplanes powered by fossil fuels (mainly oil) contributed about 14% of global greenhouse gas emissions in 2010, and unlike the energy sector, transport emissions will double by 2050 without more action. Strong emission standards for cars can help in the short term, but complete elimination of emissions from cars will ultimately be required. The UK and France are planning on banning petrol and diesel car sales by 2040.

Australia's greenhouse policies and results are a different story. Our emissions have climbed upwards every quarter since March 2015. This is despite nine large coal-fired power plants closing since 2012 due to age and lack of economic viability.

Emissions are still too high. To keep temperatures below 2°C, we have little more than two decades-worth of emissions before the global economy must achieve net zero emissions.

The Climate Council saw the challenge in Australia as being to:

1. Build a unified, bipartisan, consensus approach to climate change.

2. Create a well-defined pathway towards a net-zero emissions Australia by the mid-2040s at the latest.

3. Revitalise the Climate Change Authority.

4. Support and accelerate the many effective actions on climate change that are already being undertaken by states, territories and local governments

5. Transform Australia's position on the global stage from a laggard to a leader on climate change.

Clean energy target dumped

A Clean Energy Target recommended by Australia's Chief Scientist will not be adopted.

Liberal backbencher Craig Kelly also suggested the Government delay action on reaching the Paris climate targets until closer to 2030. The CET would have mandated a certain percentage of power be generated from gas and renewable energy, but some backbenchers did not like the idea. Tony Abbott argued a CET was effectively a "tax on coal", and Labor has now declared dumping it a win for the former prime minister.

The clean energy target was not the opposition's preferred policy option either, but Labor endorsed it because they said the model had been thought through by the chief scientist and was endorsed uniformly by stakeholders across the community. At the loss of the clean energy target Labor announced there was now no prospect of bipartisan agreement between the major parties on energy policy.

The Federal Government instead proposing a new plan to bring down electricity prices. The new National Energy Guarantee marks a major switch in government policy but there are few details.

Dumped is any form of visible subsidy scheme or tax in favour of changes to energy market rules that impose a "reliability guarantee" and an "emissions guarantee" on retailers. These guarantees can be traded in the form of contracts between utilities.

Energy participants were reportedly struggling to understand it. Levels of reliability and emissions guarantees have not been set, and the reliability settings will vary from state to state, depending on their level of wind and solar. Some described it as an emissions intensity scheme in disguise, but couldn't be sure because of the lack of detail.

The Turnbull government has undertaken not to go any further than its current Paris target of a 26-28 per cent reduction by 2030.

Modelling for the government suggests that the share of renewables in total generation will be 28-36 per cent by 2030 – and the level of wind and solar 18-24 per cent. This compares to a level of 42 per cent suggested by Finkel, Labor's 50 per cent target, and the 70 per cent deemed necessary if Australia was to get serious about meeting the international 2°C target.

The head of Origin Energy has urged the Federal Government to implement the Finkel Report's clean energy target if it wants energy prices to fall.

Origin Energy chief executive Frank Calabria said that investment in renewable energy would continue to grow even without a target but that investment would be haphazard and badly timed.

While renewable energy is now the lowest cost energy to build and produce thanks to recent technological changes and manufacturing efficiencies, Mr Calabria said the constant policy switches had eroded industry confidence and reduced investment. "I do believe that produces more volatile outcomes for prices to customers and that's something we want to avoid," he said.

Mr Calabria stressed that a bipartisan policy over a CET was essential to restore confidence to the industry and to ensure investment was available for new generation to replace the ageing fleet of coal fired generators as they were decommissioned.

Toxic pollution at Kirra Beach

Per ABC News

Low-level toxic contamination from the airport is reaching Kirra Beach from Coolangatta Creek

The Gold Coast City Council plans to place no swim signs at the creek outlet on North Kirra beach after the toxic chemical PFAS was detected early last year. "We have done extra sampling around the creek and [there are] still low levels but we feel, the catchment management guys feel, it is necessary to put up a sign at the outlet where the creek does flow onto the beach there, recommending no swimming or fishing where the outlet is," she said.

The Coolangatta Creek catchment runs through the Gold Coast Airport precinct and includes the nearby suburbs of Tugun, Bilinga, Coolangatta and Kirra. Last year, it was revealed the Federal Government's aviation safety body Air Services had used a firefighting foam containing PFAS at the airport. Air Services was warned of the chemical's possible health and environmental risks in 2008, but continued to use the toxic foam until 2010.

Leopard Seal sightings

Photo DPIPWE

A treat for Tasmanians has been a spike in leopard seal sighting, which is a good sign that there numbers are healthy. Juveniles have been resting on beaches in several places including at popular beaches like Seven Mile. Most have swum south now as it warms over Antarctica. An average of 5 per year are normally sighted, but just this winter there has been 10. The research station on the sub-Antarctic Macquarie Island has also recorded more sightings than usual

Bitter and twisted extremist hasbeen, or just unwell?

The former prime minister is back spruiking climate denialism, now that he doesn't have to win our vote.

Commentary By Mike Jacques

Tony and our Flag. "Patriotism is the last refuge of a scoundrel" – Samuel Johnson

In a recent lecture in London Tony Abbott returned to the idea that climate change isn't real and later that it is real but nothing to worry about. He said that Australia needed to adopt "evidence-based policy rather than policy-based evidence", but apparently not if it fails to agree with his perverted view.

His arguments were along the lines of 'yeah, but the beach weather is nicer. Another well-researched chestnut is, "There's evidence that higher concentrations of carbon dioxide (which is a plant food after all) are actually greening the planet and helping to lift agricultural yields." Another one, suggests it's still nice at Manly, "More than 100 years of photography at Manly Beach in my electorate does not suggest that sea levels have risen despite frequent reports from climate alarmists that this is imminent."

I'm not being rude to pick on a political party, his own party hates him way more than I do. His supporters would have spare room in a phone box.

Check online, there has been plenty of commentary proving that these comments are groundless, and I won't waste more space on his rantings. In the end, I think we need to just switch off totally and put him out of our collective misery, even if Turnbull's discomfort at his bastardy might to some seem slightly amusing.

A sceptic who has changed

Per ABC News

Richard Muller was often quoted by sceptics as a credible, high-profile scientist who doubted climate change.

He still thinks people need to remain sceptical about how we tackle climate change.

"Al Gore has grossly exaggerated global warming. And if you watch his movie you have more misinformation than information. "However, global warming is real. It is caused by humans. It is caused by the human emission of greenhouse gases, and I personally feel we have to stop it somehow."

In 2010, while doing a study for the Intergovernmental Panel on Climate Change (IPCC) data he was shocked to find a correlation between carbon dioxide emissions and warming. "Volcanoes, sunspots, orbital changes, we could all rule out. What we could do is show [that warming] matched the carbon dioxide exceedingly well."

His team made all their data available online. "The teams that did [the previous studies] said 'trust us'. We said 'don't trust us, here's what we did'. And for that reason I think we were able to win over the sceptics," he said.

He has changed but he is still no fan of mainstream conversation on the issue, "Yes I am a converted sceptic. However, anybody today who is not a sceptic about the solutions being proposed is not thinking them through."

Artificial nests for shy albatross

Per ABC News, Photos: Matthew Newton/WWF

The shy albatross only nests on three islands off the coast of Tasmania and its breeding rates have been decreasing in recent years. Artificial nests have been installed to help this threatened bird species.

Researchers believe climate change is to blame. "Out on Albatross Island the weather is getting warmer and it's getting wetter and that makes it hard for the integrity of the albatross nest to stay together," Darren Grover from WWF Australia said.

To help the birds overcome the new problems, 120 artificial nests have been delivered by helicopter.

"We know that a high quality nest is more likely to produce an albatross chick so we're trialling these artificial nests as a way of giving the population a boost in the hope that that will offset the effects of climate change," she said.

The shy albatross has been identified by the Australian Government as an important species in need of action to assist its survival.

The bird is listed as vulnerable, but there are about 15,000 breeding pairs.

Mr Grover said it was important action was taken immediately.

"If we were to leave it to the last moment when numbers were in serious decline, you may only get one shot at it and if it doesn't work that time then you might be in real trouble," he said.

The nests, which are made of materials like concrete and rammed earth, have so far been popular with the birds.

The breeding season has just started but early monitoring showed the nests were being adopted by the birds.

The shy albatross breeds on rocky islands and builds mounded nests of soil, grass, and roots. They lay one egg in the second half of September. The breeding season will continue until March. If the nests prove to be successful more will be introduced.

Shy albatross breed on Albatross Island 35 Kms offshore in Bass Strait, and on the Tasmanian south coast islands of Pedra Branca, and the Mewstone. During the breeding season, adults concentrate around southern Australia and Tasmania.

When ready to leave the nest juvenile birds spread throughout the southern oceans and are known to fly as far as South Africa.

Diving around Cairns

By M.Jacques

Oh No, not more holiday stories and slides

Not so long ago, Cairns was a sleepy rural centre in the remote tropical north. Now it has a population of 160,000 people and receives 5 million international tourists each year spending $2.5 billion. Most of this interest is based on the attractive power of the Great Barrier Reef. An accident of geography has brought the reef closer to the coast here than it is at Townsville, or other secure harbours further south. Having a hinterland that is a wet tropics World Heritage Area doesn't hurt either. It also has an international airport offering direct flights from major international cities. These days people think of Cairns and the Great Barrier Reef almost in the same sentence, when the Cairns sector is only one small section of this massive natural wonder.

As a result of this focussed tourism, there are a range of facilities from the staggeringly expensive and exclusive, to the budget-friendly. Visitor numbers are growing, especially East Asian tourists. Despite frequent ups and downs in the international economy and concerns about the long-term health of the reef, tourist incomes in Queensland are expected to double to $30 billion by 2020.

It is a credit to the skilful management of the reef that the impact of this mass tourism has been limited to date and doesn't represent a major threat to the reef. Despite the huge visitor numbers, Cairns and Green Island are still typified by lazy strolls along palm- lined walkways and beaches with

vistas largely unmarred by litter, sewerage outfalls and looming high rise towers.

Cairns has a tropical climate, with generally hot and humid summers and milder dry winters. The average annual rainfall is 1992mm but the majority of Cairn's rainfall occurs during summer between January and March. The cyclone season is normally confined to between December and April.

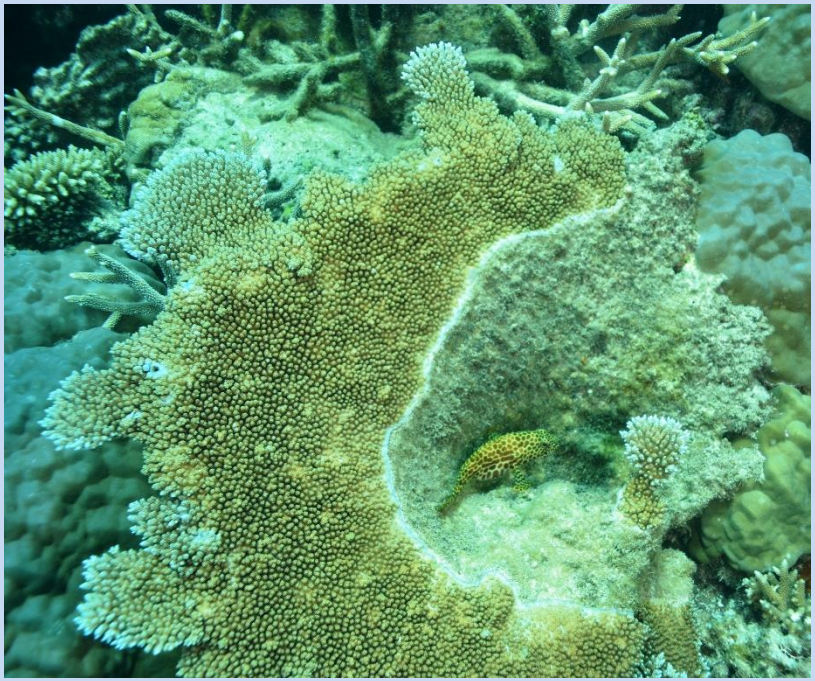
The months from May to October are dominated by the south east trade stream. These moist onshore winds often produce showers, mostly overnight. The strongest winds (cyclones excluded) usually occurring during April and August. During the summer months, North to Northeasterly sea breezes dominate the winds along the coast.

The tropics have fairly uniform temperatures throughout the year. Typical daytime min/max temperature ranges in Cairns are 23C/31C in mid-Summer and 18C/26C in mid-Winter.

	Max ° C	**Water Temp**	**Natural events**
Dec - February	31.6 -30.4	28-29	many turtle species are nesting and hatching most active cyclone season
March - May	25.8 - 29.2	26-27	juvenile fish are starting to appear Black-tipped Reef Sharks give birth From May trade winds start coming up from the south
June - Aug	23.5 - 24.6	22-24	Dwarfe Minke whales and Manta Rays arrive on outer reefs It can be windy From August Humpback whales arrive
Sept - Nov	27.3 -31.2	23 -26	The trade winds have started to drop by Oct. Fish aggregate in the reef shallows for spawning Seabirds breed turtle mating and nesting Nov coral spawning

Where to go on coral reef depends a little on recent events. Disturbance by cyclones and crown of thorns starfish, coral disease and *Drupella* snail plagues are natural to a degree. The majority of reefs have recovered from Cyclone Yasi in 2011. The Cairns reefs largely missed a huge coral mortality event in March 2016, that badly damaged reefs further to the north. A more recent warming even has also caused some minor damage, about 15% of local reefs but mostly in the top 6 metres of water.

The international media response to the 2016 warming event was to pronounce the reef "dead", which is far from the case. The majority of the reef is currently in pretty good health, especially off Cairns. Only the sector north of Cooktown is currently very damaged (up to 65%). Having said that there are worrying signs for the long-term future health of the reef's northern sectors. Currently there is no reason not to go there.



Charter boats out of Cairns are numerous and the pricing is sometimes quite good considering the big effort it takes to get to the reef. They will depart on different days, to different places and for varying durations. The choices can seem bewildering, but in effect Cairns reef charters are run by two main companies and a handful of smaller independents, operating boats under an array of trading names that basically don't mean a lot.

There are a number of large day ferries taking the time poor out to licensed moorings on the more visited reefs. Some stop off at pontoons that offer varying types of activities, but usually some snorkeling or diving. Some have family friendly activities too. This is a good spot to take your elderly parents or kids out for a glass-bottomed boat, helicopter, or submersible ride. It can get crowded and they don't necessarily move the pontoon when the reef is damaged by a natural event. There are always great things to see, but this usually isn't the type of pristine reef you might commonly see on the outer reef.

There are also dedicated diving day boats, usually offering a very crammed schedule of 3 outer reef dives in a day. To get you back on time safely there needs to be a fast-moving and disciplined dive schedule and expect to see the crew almost running to keep up with the pace. No lazy book reading between these dives.

A few hundred dollars more will get you short 2-4 night stays on a larger liveaboard, with an opportunity to enjoy the sunset, get a tan, organize some photos, and take a bit more time exploring the reef shelf. Each operator has allocated moorings, so they each offer slightly differently named dives in the same general area. Up to 4 dives a day are offered. Most trips are well-organised, active and good quality. There are a few boats offering these medium-length cruises, so shop around for the right fit for you.

Expect to pay two to three thousand dollars plus for longer trips up to a week or more. They tend to visit more remote locations, including the Coral Sea and even the Torres Strait. Some are diver focussed, others less so. The group sizes tend to be smaller, and often they run special activities like whale encounters and research activities. Some of the boats are well-appointed, but you are at sea and will have to rough it a little. No amount of money makes a vessel totally stable in a rough sea.

The Great Barrier Reef is mostly well offshore, out of sight of land, and partly in the open ocean. You need to pack a sense of humour and just roll with the mild noise and rocking motion that might come with even the pricey boats.

A Typical Day on the Outer Reef

Turn up to the Cairns or Port Douglas jetty reasonably early as there can be queues to pick up tickets and get directions to the right boat out in the crowded marina.

The outward journey is across the inner reef shelf, a shallow waterway never deeper than 65 metres, studded with reefs, and usually subject to choppy seas. Locally, it is known as the "paddock" and the boats will rock and roll. People prone to motion sickness, or with little small boat experience, need to take medicine well before setting off.

Safety briefings fill up the short ride out to the reef, as little as 40 kms off Port Douglas or slightly longer off Cairns, depending on where you are going. Moored behind the protection of the reef, the boats are then a lot more stable. Commercial boats tie up to fixed moorings on the protected western side of the reefs, the deep drop-offs on the wild ocean side are rarely accessible. Don't expect a coconut fringed sand island to be nearby, most of the reefs almost completely disappear at high tide.

Close to the reef there is a mad scramble to organise gear and get the first dive underway. Expect queues of varying length as you enter off the back of the boat, which with the day and short-stay boats, you will share with a mix of snorkelers, student divers and certified divers.

The dives on the sheltered western side of the reefs aren't usually particularly hard, appropriately considering the mixed capabilities of the guests on many boats. Don't expect depths over 25 metres or anything too current affected. Anyway, the better dives are often in the well-lit shallows anyway, at least in terms of varied coral formations and varied resident reef fish.

To get to the deeper drop off dive locations and see big sea fans and schools of pelagic fish, you may need to book a longer offshore cruise that particularly caters for experienced divers.

Guided or unguided dives (for certified divers) are on offer. A night dive is also usually available on overnight voyages. There are strict regulations governing commercial dives in Queensland in response to tourist fatalities, so expect a very regimented and safety-focussed set of diving instructions. Don't worry about travelling solo. Everyone on board is on holidays and usually happy to buddy up with anyone.

It is the United Nations of diving and you will meet an interesting array of people from all over the world. A longer charter trip with loved ones, or a few good friends (you will make some more while you are there too if you try to engage with people), is an experience you will remember forever.

Snippets

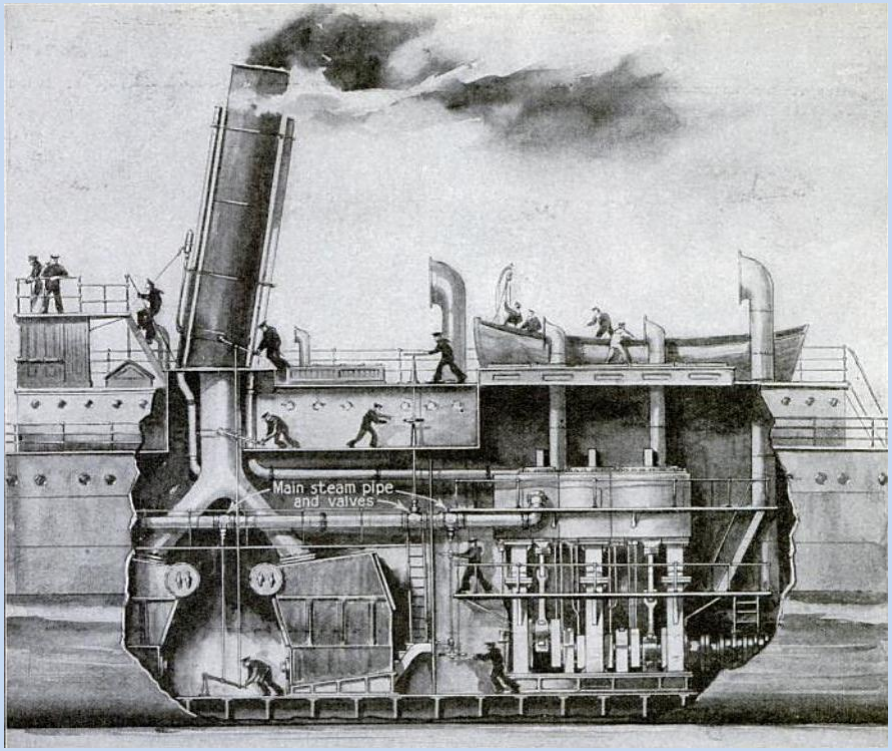
Freeing whales tangles in fishing net, don't try it yourself

http://www.themercury.com.au/news/tasmania/fisherman-helps-free-entangled-whale-on-tasmanias-southeast-coast/news-story/4b4df734506e29c3ba8e7235e0db83e2

Historic cutter Wyuna to be preserved in Victoria

http://www.abc.net.au/news/2017-10-27/money-found-to-save-historic-ship-wyuna/9087782

Shipwrecks and their Triple expansion steam engines



Triple expansion engines were more fuel efficient than earlier engines, so they revolutionised international trade.

A triple-expansion engine is a compound engine that expands the steam in three stages, extracting more of its energy rather than expelling it after running one of two big cylinders. The first successful commercial use was an engine built at Govan in Scotland by Alexander C. Kirk for the SS *Aberdeen* in 1881.

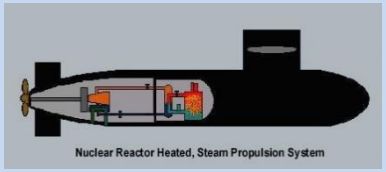
They used less fuel per unit of power developed so the ship could travel further on the same amount of fuel. The amount of space taken by bunkers was less. The reduction in fuel burned per unit of power also meant a reduction in boiler capacity and fewer firemen and coal trimmers. Smaller boilers also took up less space.

They made trade truly global, a ship could travel anywhere with only limited stops for refuelling. Maritime freight rates fell on average by 50% while global trade increased 400% from 1870 to 1913. Sailing ships numbers stagnated, with all the growth being taken up by steamers, most commonly powered by triple expansion steam engines.

Triple expansion engines were the backbone of the shipping industry for many years from the mid 1880s right through to the end of the Second World War. All 2,700 Liberty ships built by the United States during World War II were powered by triple-expansion engines. Then trade was taken over by gas turbine and other types of marine engines based on burning mineral-oil products. The wispy black smudge of coal smoke finally disappeared from the ocean horizon.

As there were very large number of triple expansion ships working the world's oceans during a trade boom, there are many shipwrecked triple expansion steamers in Australia. They are commonly visited by divers and can be distinguished by their multiple cylinders, each one smaller in diameter than the last.

Did You Know?



Steam engines are still in use even today, nuclear submarines superheat steam but use radioactive material rather than coal as a heat source.

The S.S. "Cooma"

This wreck of Gladstone was a popular wreck dive off Gladstone in the 1980s and 1990s when the Swains were popular charter boat destinations. The old wreck was done as an easy dive on the way home. Now she is rarely visited, but is still a local landmark as he engine dries at low water.

The 3,839 gross ton, 100 metre long steel steamship was built as a passenger vessel by A Stephens & Sons Ltd, Linthouse in the UK. She had a triple expansion engine of 593nhp and 4 coal fired boilers.

She worked the Melbourne - North Queensland run, carrying passengers in two classes and was capable of 15 knots. She was popular on that service until, on 7th July 1926 she ran aground on North Reef near Rockhampton in calm weather. An unexplained explosion in No. 3 hold the following day, after all passengers had been evacuated left salvage impossible and she was abandoned as a total loss.

The S.S. "Cremer"

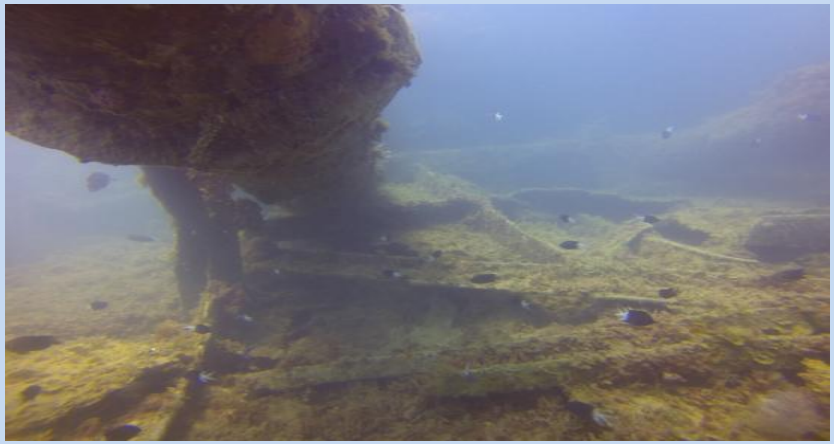
2-10m

The Cremer was a large passenger and cargo ship that was a regular trader to Indonesia, Singapore and China.

In September 1943, it ran aground off St Bees Island during a storm. There were no casualties. The ship was stripped of all major equipment and then abandoned.

The wreck was rediscovered in September 1984 under a cliff on St Bees Island. The wreck of the "SS Cremer" lies about 20 nm northeast of Mackay. The remains of the iron hull, engine blocks, propeller shaft, flywheel and deck machinery can be seen. The engine area is mostly intact, with two engines (each about 8 metres long) and a propeller shaft still attached. It is now a popular site for snorkelling and diving. The Cremer is a relatively protected site and can be dived almost any time of the day. As with any inner reef diving on the barrier reef, the visibility varies. The Cremer is a shallow dive closer to land and is covered in a lot of algae with only small corals. The fish life is good and includes Brown Sweetlip and Honeycomb Grouper amongst many others. Turtles are also seen around the wreck.

Photo per AIMA



Keswick Underwater Adventures

The Bastards from Bingil Bay

Recently we celebrated 50 years since the birth of activism for a Great Barrier Reef Marine Park with a return to where it all started, "Ninney Rise" in Bingil Bay near Dunk Island. There artist John Busst was the focal point for a new eco activist movement.

Eddie Hegerl and John Busst,
Photo Eddie Hegerl

John Busst's home in Bingil Bay is now heritage listed. It is managed by a trust who keep it pretty much as it was, a comfortable old bungalow on the rise overlooking the bay, surrounded by trees. The house isn't sign posted and many locals don't even know that it exists. We had to ask around at the local café to even work out where it was. We just stopped by for a brief look, the tickets to the big official open day, complete with national media coverage, were already sold out. In some ways it was better, we saw it more as it was at the time, a relaxed home where an artist might go for inspiration. Even the bay is little changed since the 1960s, unlike the nearby Mission Beach tourist precinct.

John Busst was a member of the "Escape artists of the North" a group of artists that came to North Queensland in the 1930s to escape the city and enjoy a tropical idyll. John originally lived on Bedarra Island, but later moved to the adjacent mainland near Mission Beach at Bingil Bay. He was probably the inspiration for the British film "Age of Consent" (filmed on Dunk Island) that along with some racy nude scenes, sold the Great Barrier Reef to the world as a unique tropical utopia.

The reality was much harsher. The reef had been subject to some pretty extreme exploitation from guano mining, sediments from agriculture, turtle soup factories and roughly built and managed tourist resorts. In 1967, John Busst saw a mining application notice in the local paper. The cane farmer wanted to mine lime from Ellison Reef for use as fertiliser. The developer claimed that the reef was dead, so it was no big deal. Moderate coral cover may be normal for this area and there is some evidence that cyclical crown of thorns starfish outbreaks have been going on for many decades. During 1967, outbreaks might have made the reef seem "dead" in the shallows to an untrained eye.

Opposition coalesced around John Busst, the poet Judith Wright, and Len Webb. With the help of some student divers, they formed Queensland Wildlife Protection Society.

Divers were sent out to inspect the reef. The divers were able to demonstrate that Ellison was, like most reefs, a normal pattern of dead and living corals full of life. Eddie Hegerl first dived on Ellison Reef as a penniless 22-year-old researcher. Hegerl recorded about 26 species of fish and a colleague Ross Robertson

found 88 species of coral. Although that count nothing special by GBR standards it was, "Very much a thriving reef."

They also persuaded the Innisfail Mining Warden in a court battle, that mining silt could not be contained and would spread to other coral reefs.

The then-Bjelke-Petersen government decided to open the entire reef for oil and gas exploration and you had to live in that time to appreciate how brazen and corrupt this government was. It later emerged that the premier and his ministers had invested heavily in the oil companies affected. Premier Joh Bjelke-Petersen was forced to do an environmental impact assessment, so he gave the job to an American mining geologist. He reported that oil-mining prospects looked good and that dead reefs could be used for cement manufacture. In 1979, the-mining minister Ron Camm even claimed in the media that "crude oil encouraged coral growth".

A lot of vitriol was directed against the campaigners, with John Busst calling himself, the “Bastard of Bingil Bay” after hectoring from the government. He predicted that the Great Barrier Reef would one day become “a quarry surrounded by an oil slick”.

In the end, intensive popular campaigning, threats of trade union bans, and bipartisan legislative action by the Federal government, led in June 1975 to the creation of the Great Barrier Reef Marine Park. Not everyone liked the multi-use compromise at the time, but it could easily be the best managed marine conservation area in the world now.

What happened to Ellison Reef?

Five years ago when Eddie Hegerl returned to Ellison Reef for the 45th anniversary, he found some damage caused by cyclones and crown of thorns starfish. Since then sea temperatures have been warm enough to cause two consecutive major bleaching events on the GBR as a whole, and there have been several cyclones.

Five years after his last dive, Eddie Hegerl (at age 72) returned to dive on Ellison Reef to mark the 50th anniversary of the campaign to save it. This time, the damage was more extensive. Other reefs in the region are in good condition, but he found Ellison to be badly damaged. "Very little live coral, very little in this area anyway — very depressing and we've got to do better somehow," Mr Hegerl said.

Ellison Reef has been surveyed by AIMS since 1986 and it isn’t a very happy story, although overall the reef does not seem as bad as the area recently dived for the recent commemorative event.

When first formally surveyed in 1986 live coral cover was moderate (10-30%). The reef was classified as recovering from a prior crown of thorns starfish (COTS) outbreak. Small numbers of COTS continued to eat down the remaining coral cover to a low level (0-10% cover). Coral cover increased after 1987, peaking in 1997 at moderate levels again.

Then surveys in 2000 showed a dramatic increase in COTS and the coral was again devastated to very low levels (0-5%). It very slowly picked up from there even though Cyclone Yasi passed almost directly over the reef in February 2011. Since this time there have been clear signs of recovery with coral cover reaching moderate levels (10-20%) by 2015. The COTS have gone for now which might be one of the reasons for its recovery. Elevated coral bleaching affecting up to 10% of total coral cover was observed on the back of Ellison Reef. White syndrome disease also affected coral colonies on the flank of the reef.

Photo: Christopher Tilt

Scientists and conservationists want Australians to demand stronger action on climate change and sediment run-off. The Federal and Queensland governments have committed to the Reef 2050 strategy and have promised to bring forward a review of the plan, but the campaigners said more was needed.

Snippets

Bad report card on biodiversity loss.

http://www.abc.net.au/news/science/2017-10-26/australia-biodiversity-loss-conservation/8987696

US Report tells Trump that climate change is real

http://www.news.com.au/world/breaking-news/humans-cause-climate-change-us-report/news-story/83ce68c5ae3e269fb7ee1a9d2f3ba6e3

Slow death of a unique resource - Cairns wader numbers lowest ever recorded

By Tony Neilson http://www.naturalimages.net.au

Stormwater sand being spread along Cairns Esplanade – ©Tony Neilson

Migratory shorebird populations in the Cairns area of Far North Queensland continue to fall at a dramatic rate.

Although not a site of great significance in the global scheme of wading bird things, it is special for one important reason.

For decades, the city's esplanade has been a magnet to local and international birders and photographers because the roosting shorebirds can be observed at very close quarters.

Until about 2014 it was common to see 2000 – 3000 waders a day along the Trinity Bay shoreline at high tide. But that is no longer the case.

News got worse

A late September 2016 count in the bay area by local birders produced less than 1000 waders. And the news just got a whole lot worse. A 30 September 2017 survey by roughly the same group identified 650 waders – the lowest ever recorded at that time of year. (Red-necked stints and bar-tailed godwits made up 63%.)

Red-necked stints now the most numerous Cairns shorebirds – ©Tony Neilson

External factors such as climate change and massive feeding ground loss along the East Asian-Australasian flyway will have contributed to this disaster. But there is another likely culprit much closer to home.

Massive quantities of sand added (for largely aesthetic reasons) to the esplanade foreshore by the Cairns Regional Council, has degraded the previously nutrient-rich mudflats.

Indications 'normal'

Accurate counts of shorebird returns at key sites around Australia and New Zealand won't be available until late November, but early indications are that they are 'normal'.

That being so, it would be reasonable to assume the Cairns decline is more a case of the waders going elsewhere for food than any of the other external factors.

Local birding groups continue to work with the Cairns council on various remedial initiatives, but progress is slow and full recovery of the vast mudflat ecosystem may ultimately rely on Nature herself.

Tony Neilson

I had the pleasure of meeting Tony recently in Cairns. For most of his career, Tony has been associated in some way with the media: as a journalist, photographer, publisher, marketer and public relations executive. Born in New Zealand and a longtime resident in Australia's tropical north where he writes and photographs across a broad range of wildlife and sustainability subjects – including his beloved birds! Check out his webpage.
http://www.naturalimages.net.au

The Cairns Esplanade

Who Loves Mud? Maybe not all tourists, but for shorebirds and marine animals it's an oasis in fast changing world.

By Mike Jacques

Tidal flats support a range of birds and marine animals including these mudskippers, Roebuck Bay, WA – ©Tony Neilson

Let's face it, foreshore tidal flats are sticky and unpleasant to walk on, they look 'dirty' and if you a silly enough to add pollution, they can get pretty smelly too.

Many tourists look, but don't see the mudflats as an ecosystem, "a big shitty mud heap" is one comment about Cairn's lack of a beach culture. That was someone who obviously didn't go to one of the Cairns region's many alternative and nearby sandy beaches, or use the artificial "swimming lagoon" right on the Esplanade.

Our track record when we encounter mud flats or mangroves is to try to 'beautify' them until it fits the picture postcard image in our minds. However, they are not dead wastelands, and the 'ugly' mud holds an interesting array of living things that should be a tourist attraction in its own right.

That has happened to a degree on the Cairns Esplanade. While some still hate it, nature enthusiasts are travelling from all over the world to watch up to 200 species of migratory birds gather on the mudflats.

The Cairns Esplanade tidal foreshore has been a topical issue since the first Europeans came ashore. After World War II, the availability of heavy earth moving machinery has really allowed us to reshape our shores into our own image of a tropical utopia.

Old photos recovered by the Cairns Post say that the esplanade was once a sandy beach. It is claimed that during the dredging of the Grafton Channel for shipping in the early 20th century, mud dumped close offshore was washed back in to the inlet and covered the esplanade beach with mud.

Some tourist industry leaders have argued that the mudflats are an artificial ecosystem which should be put right. But environmentalists say that the area has been in it's current form long enough to be home to thousands of species of mud-dwelling creatures, and to dump sand on top of them is vandalism.

Racing on the "mudflats" 1914, note both the mangroves and the relatively compact nature of what appears to be a sand/mud mix at least along the close foreshore.TROVE

I didn't find as conclusive a result as the Cairns Post in my 10 minute potted re-examination of photos. Trove also shows that in 1876 Captain Owen struggled through "a long stretch of mud" when trying to land miners during a low tide (*Telegraph 17/10/1876*). The bar that blocked the harbour (before dredging started) had prevented him from using the port.

It might be that a sand/mud mix of periodically varying depth and coarseness is 'natural' in Trinity Bay's Esplanade foreshore.

The Cairns Regional Council has been dumping sand spoil on the beach for years. After the sand started to spread and compact, recently it smothered the nutrient-rich muds. After a protest led by international birdwatchers, the Council is at least starting to sound like it gets that there is more to the issue, although some real action is slow to materialise.

Cairns deputy mayor Terry James acknowledged the issue, but for my money, did not really acknowledge that there was an immediate problem, "We need to know whether the sand is having an effect on the birds or not." This isn't actually in doubt.

He acknowledged there was concern within the birdwatching community that the sand deposits would bury the birds' habitat. To deal with complaints, there was talk of cessation of sand dumping, improved stormwater management, barriers to protect key roosting spots and new public signage to better explain why waders should not be disturbed. Not much action yet though, so I understand.

The Council has also commissioned a James Cook University study led by geoscientist Professor Jon Nott, to find out why sand has been accumulating and compacting along areas of the Cairns foreshore, even where sand hadn't been deposited. "We're just really trying to understand more about the movement of the sand along the Esplanade, to try and get a handle on how we should try and deal with it,'' Prof Nott said.

The Deputy Mayor said the study would also aim to rule out whether the council's own activities in replenishing sand along coastal stretches were responsible for the deposits.

"Council occasionally replenishes sand on the Esplanade, so we just want to make sure with this study that what we're doing isn't affecting it, and what's generally happening is a natural occurrence, hopefully,'' he said. To the extent that the Council adds sand it can't be natural, but we might find out more about the extent to which our intervention is messing up this important bird habitat.

If there is a problem with changed hydrodynamics in the inlet, I'd be having a look at dredging and the hardening of the coastline with seawalls too, which I suspect Prof Nott will also consider.

Sources, http://www.cairnsesplanade.com/index.html, Cairns Post, Trove, http://www.naturalimages.net.au

Antarctic Fish

There are only a few types of Antarctic fish, all well-adapted to the cold.

Mackerel icefish

The mackerel icefish (*Champsocephalus gunnari*) is one of a group of species exclusively found in the Southern Ocean known as 'white-blooded' fishes. These fishes survive without the red oxygen carrying pigment haemoglobin in their blood cells that other fishes have. This means their blood is colourless.

Mackerel icefish grow to 44 cm long at the Heard and McDonald Islands and are thought to live 4-5 years.

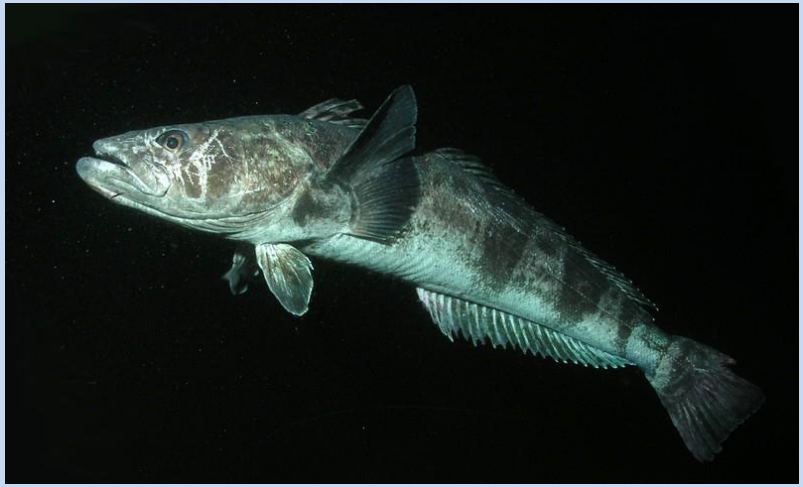
This species is found mainly around the Heard and McDonald Islands, Îles Kerguelen and island in the south Atlantic such as South Georgia.

Mackerel icefish was once the most abundant species found near shore in waters less than 400 m. Declines in population sizes in the 1970s and 1980s linked to overfishing have resulted in less icefish being available for fishing.

Icefish form schools and migrate each 24 hours from near the seafloor during the day to feed on plankton and small fish (including juvenile icefish) in midwater during the night.

They are an important food for many seabirds and seals, and also other large fish.

Antarctic toothfish and Patagonian toothfish



There are two species of toothfish: the Antarctic toothfish (*Dissostichus mawsoni*) and the Patagonian toothfish (*Dissostichus eleginoides*).

They are very similar in appearance and habits but the Antarctic toothfish is found in the high latitude region close to the Antarctic continent whereas the Patagonian toothfish is found in

subantarctic waters on shelves around islands and submarine banks.

Toothfish are bottom-living, in depths of 100 m to 3000 m, but move off the bottom on occasion to feed. The Antarctic toothfish has antifreeze proteins in its tissues and blood because the seawater is below the normal freezing point of tissue. The Patagonian toothfish does not have these proteins because it lives in warmer water.

Illegal fishing of the Patagonian toothfish was a very serious problem in the late 1990s and early 2000s. In 1997/98 about 11000 tonnes were caught legally in the CCAMLR area, but the illegal catch was estimated to be 32000 tonnes. In some areas the illegal activities have reduced the stocks of toothfish markedly. Several nations have arrested a number of boats fishing illegally.

Toothfish can grow up to 2 m long and weigh 100 kg when fully grown. They can live up to 45 years. Toothfish eat small fish and squid in midwater and a range of fish, crabs and prawns on the bottom.

Antarctic cods and plunderfish (*Notothenia*)

One of the most abundant groups are the Notothenioids, also referred to Antarctic cods (although they are not true cods). These fish have an antifreeze in their blood which prevents it from freezing despite being close to ice.

The 'antifreeze' glycoproteins in notothenioid fish - also known as icefish - enabled them to survive when a global freeze led to a mass extinction of other species around 42 million years ago.

This gave them an evolutionary edge - there are now 100 different species of notothenioids - but is now putting the species, a major food for penguins and seals, at risk as the ocean warms.

Drones in Ice

At the ends of the Earth, climate change is altering the polar landscape faster than ever before. The poles are melting. In Antarctica, a collapse of the western ice sheet could raise global sea levels and inundate the world's coasts. Scientists turn to drone-mounted cameras to measure sea ice, but flying drones in Antarctica isn't that easy.

Source: Williams, G. D., et al. (2016), Drones in a cold climate, Eos, 97, *doi:10.1029/2016EO043673. Published on 19 January 2016.*

Credit: K. Gavahan

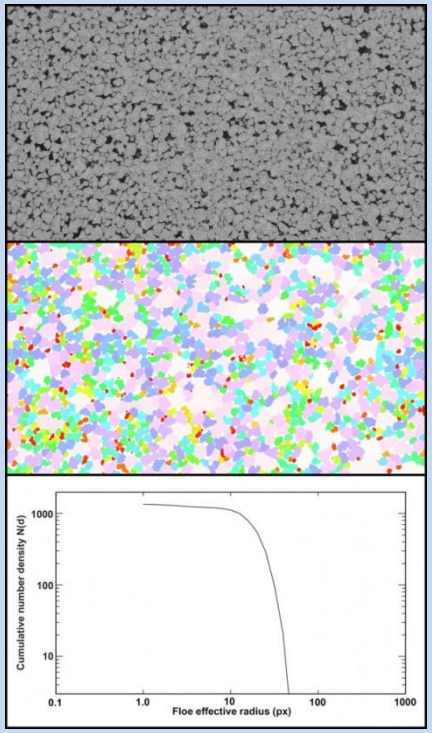
Satellite observations need to be checked by on-ground validation from airplanes or helicopters, but these missions are very expensive and challenging. Helicopters cannot land on a sparse sea ice field. Polar researchers are beginning to use of unmanned aerial vehicles (UAVs), more commonly known as drones. Drone pilots face high winds, temperatures below freezing, and landing on a moving ship. A pilot study of drones was conducted from the U.S. icebreaker *Nathaniel B. Palmer* in April 2015.

Sea ice is often referred to as the "canary in the coal mine" when it comes to monitoring the effects of climate change at the poles. Sea ice, a relatively thin layer (meters thick, in contrast to the kilometers-thick continental ice sheets) forms each winter at the surface of the freezing polar oceans. It is a dynamic and complex, making it an interesting area of study. The key area is the marginal ice zone (MIZ), where the open ocean meets the ice and a complex interaction between wind and waves controls seasonal advance and retreat.

Arctic sea ice is declining dramatically, but mean Antarctic sea ice extent is increasing slightly (but not uniformly and it is retreating in some areas). Global climate models lack information on how waves and sea ice interact. Enter drones.

Scientists have long deployed autonomous submersibles to survey below the sea ice. Newer multirotor drones have become become dramatically easier to fly. Guy Williams, was the pilot in command for all flights. He was trained at the University of Tasmania. He had 15 months' experience prior to the mission and completed more than 10 hours on each platform.

For testing, they chose two off-the-shelf models: the Phantom 2 Vision+ quadcopter and the more advanced eight-rotor Spreading Wings S1000. Both models successfully operated in the polar environment. Both types of UAV were launched in attitude mode (ATTI), in which the drone automatically maintains orientation but not position. The drones were unable to operate their GPS mode, because this played up close to the magnetic poles. Nonetheless, the drone was able to acquire aerial imagery.



There was also some erratic behavior which was later fixed by a bug patch in the software. Drones could fly only when wind speeds were 15 knots or less with plenty of daylight. As such, they completed nine flights on three separate occasions.

One key indicator of the annual advance and retreat of sea ice is the size distribution of the ice floes.

The aerial image of pancake field ice is taken, then converted in to sizes and then a density graph.

Both the S1000 and the Phantom 2 proved capable of taking basic aerial imagery suitable for determining floe size distribution, with a basic correction using PTLens applied to the latter to remove the pin-barrel distortion of its mounted GoPro camera. Optimized mapping surveys over large continuous floes promise to return much greater detail in the surface morphology.

The operations were conducted safely, with greatly reduced risk and cost compared to helicopter operations.

They learned some important lessons:

- The purchase price of an off-the-shelf drone is only a quarter of the total expense. Add spares, cases, training, and certification.
- Current consumer-grade multirotor UAVs are best suited to gaining a quick bird's-eye view of the ship and surrounding ice. True aerial mapping with multirotor drones will require more sophisticated models with better performance.
- Pilot experience, certification, and operational background are critical to handle the challenge of polar operations. Pilots must also have extensive training in maintenance

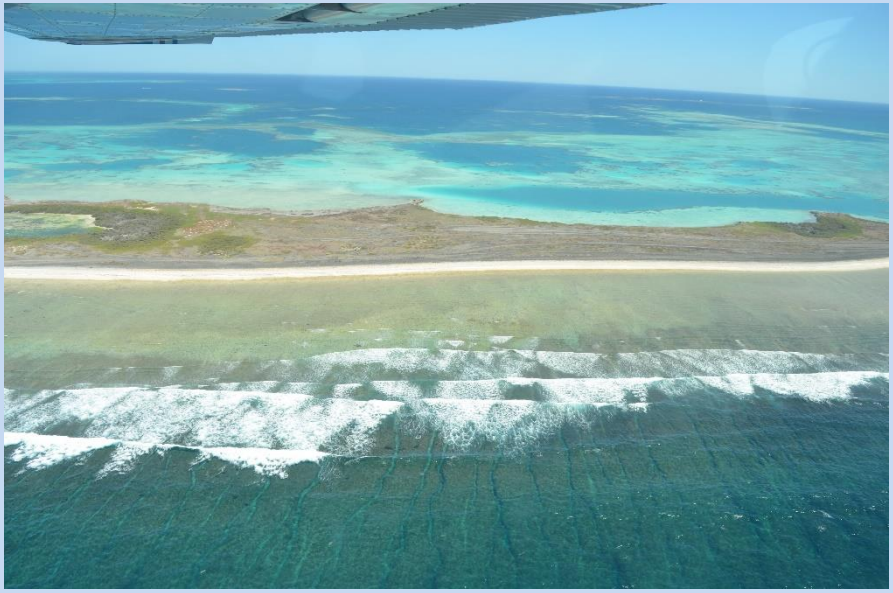
U.S. icebreaker Nathaniel B. Palmer *from the drone.*

For the next trip to the Arctic they brought a fixed wing military drone. I have a suspicion that despite the nice photos, off the shelf products were a bit too much of a handful for Antarctica, which is hardly surprising.

Australian Guano Islands - Western Coasts

In the 19th century guano was like gold, and big rushes saw the devastation of Australian bird islands.

Abrohlos



Anthony Curtis arranged for the first commercial shipment of guano to leave WA's Abrolhos Islands in 1844. The commercial guano industry at the Abrolhos was developed by the Pelsart Fishing Company from 1847, mining guano at a number of islands.

Rat Island in the Easter Group of the Houtman Abrolhos was pared back to a bleached skeleton of coralline limestone by guano miners. They also introduced pests. During the colonial period Rat Island alone supported one and half million tropical terns. By the late 1930s terns and other seabirds had been wiped out by the combined impacts of habitat alteration, egg-harvesting, rat predation and introduction of feral cats. Guano continued to be mined at the Abrolhos until 1946. The remnants of buildings, jetties and tramways used for guano mining are still visible on Rat Island, Gun Island, Pelsaert Island and Pigeon Island. At least five guano ships ran afoul of the reefs and sand bars in the Abrolhos, including the German barque Hadda in 1877.

Shark Bay

Guano mining was the first land-based industry in Shark Bay and initiated European settlement of the area in 1850. It also provided the colony of Western Australia with one of its earliest commercial exports.

Mining started in 1850 at Egg Island off the east coast of Dirk Hartog Island then progressed to, and quickly stripped, at least 13 islands in Henri Freycinet Harbour. These included Smith, Sunday and Eagle islands, and North and South Guano islands.

Anxious to protect this valuable commodity, the Government established a garrison at Quoin Bluff on Dirk Hartog Island in

1850. Another military outpost was later established at Cape Heirisson.

Bad weather, uncharted shoals and unsure anchorages made it difficult for large vessels. In 1850 the 443-ton barque Prince Charlie struck the Levillain shoal off Cape Levillain after loading guano. This shoal also claimed the 125-ton barque Macquarie with guano cargo in 1878. The shipwrecked sailors struggled back to Cape Levillain then walked south for three days without food or water until rescued by a vessel in South Passage.

A relic of this era is the wreck of the Hadda. She was built in Germany in 1860, and in 1877 en route from the Lacepede Islands in ballast. It struck the reef close to Beacon Island at 10 p.m. on the night of 30 April 1877. Sail was lowered and the boats took anchors out in an attempt to kedge the barque off the reef. As it had run right up onto the reef this proved futile. The crew remained aboard the Hadda until 7 May when, with the water up to the vessel's lower deck beams, they abandoned it and sailed with a favourable wind for Geraldton. They arrived there the following day, suffering from exhaustion and exposure. The wreck lies in waters protected by all except northerly winds, 720 m ENE of Beacon Island, Wallabi Group.

The wreck lies in a gully at the edge of a coral reef in depths ranging from 2 to 5.6 m. It is oriented in a SSE to NNW direction and covers an area of about 40 m by 19 m. There is a substantial amount of the hull remaining, particularly a large portion of the port side.

Lacepedes

In the 19th-century, the Lacepede Islands off the Kimberley were among numerous islands of Western Australian that were mined for guano. Although much of the guano mined was by Western Australian industry, there was also extensive unauthorised mining by trading ships from other countries, especially the United States. The rights to the island sparked a long-running diplomatic incident with the USA.

In February 1877 a ferocious storm lashed the Lacepede Islands. Ten vessels were lost; the only one to survive was the barque Prince Arthur

The extraction of guano was wound down in 1879 when the schooner Aurora removed the machinery used for extraction. The manager Captain R McEachern estimated that the quantity of guano left on the islands was less than 2000 tons.

Oceans and Disease

Fish Ulcers/Red Spot Disease

An example of a pathogenic disease affecting fish is Epizooitic Ulcerative Syndrome (EUS; also known as 'red-spot' disease). Low-pH (acidity) in the water increases the susceptibility of fish to this fungal disease.

This is more common in areas with exposure to acid water and toxic heavy metals associated with mining.

Even in undisturbed areas, some soils are naturally acidic which is why it is important to do environmental impact statements for any major excavations. Acid sulfate soils are readily disturbed by dredging.

The high acidity water damages fish skin and gills, increasing the susceptibility of fish to fungal infections. EUS results in red ulcerative lesions on fish that can kill them.

Patchy Global change for kelp forests but disaster in Australia

Although widespread around the globe, kelp can be fussy. It likes the water cool and well-nourished, those areas are increasingly patchy as the planet warms and the ocean changes. Most recently all the giant kelp forests on Tasmania's East Coast have disappeared. Ecklonia kelp has retreated down the WA Coast while the Sydney's and Adelaide's coasts remain bare after decades of heavy pollution. In other countries its doing fine.

A sea otter in California. worldswildlifewonders / Shutterstock

Big brown kelp forests are found on the coastline of every continent except Antarctica. They rely on clear, nutrient-rich water for growth, and thrive in temperatures between 5 and 20 Celsius.

Climate change makes water hotter and weakens the currents that drive nutrients up from the ocean's depths.

The Proceedings of the National Academy of Sciences recently found that for major kelp ecosystems where we have data, 38 percent were declining and 27 percent showed small levels of growth. A further 35 percent showed no change. The modest global decline, came with massive variations on local and regional scales. Giant kelp in much of North America is flourishing, despite a years-long marine heat wave. But across the Pacific, hot water is wiping out ancient kelp forests practically overnight.

Kira Krumhansl, a researcher at Simon Fraser University said, "Our findings show that there's a lot we can do locally to manage the health of kelp ecosystems," she added. These include reducing pollution and ending the overfishing or overhunting of predators that eat herbivores like sea urchins, which can mow down kelp forests if left unchecked.

In British Columbia kelp is "relatively stable or even increasing" in large part thanks to rebounding populations of urchin-eating sea otters, which were once ruthlessly hunted for their fur.

Australia is literally a half world away from British Columbia. In 2011, a severe marine heat wave wiped out kelp forests along 100 kilometers (62 miles) of WA coastline. In South Australia, the kelp has succumbed to years of pollution from nutrient-rich wastewater. And in Tasmania, currents are depleted of nutrients and warming has enabled a kelp-eating sea urchin to jump from the mainland and graze on local kelp forests. This is compounded by overfishing of large lobsters, which normally eat the urchins.

In NSW, over ten years, kelp forests have completely disappeared in some key offshore sites such as at the Solitary Islands Marine Park. Tropical species are starting to take over.

Thomas Wernberg, a researcher at the University of Western Australia, said that Australia's kelp forests may have been particularly hard-hit because they already live near the upper limit of their heat tolerance. This region is also one of the fastest warming spots on earth, with a big intensification of major southwards-flowing currents that carry warm, nutrient-poor water and transport new kelp herbivores.

Wernberg explained that they are predicted to worsen. "It is hard to see how this could be turned around in the foreseeable future," he said. "Giant kelp is likely to go functionally extinct in Australia within the next 50 to 100 years, if not sooner." Wernberg calls the giant kelp the panda of Australia's temperate waters, "because it's big and charismatic and probably doomed for extinction".

Professor Craig Johnson says, it will bring to an end to an ecosystem that has dominated Tasmania's east coast for tens of thousands of years.

In 2012, giant kelp forests were listed as an endangered ecological community by Australia's government, the first marine community to be considered as such.

As the kelp forests decline, other forms of smaller kelp can replace them. The complex structure of the forest is lost along with the massive capacity for capturing nutrients and recycling them into the surrounding waters. But with increasing frequency, the forests are being replaced with "urchin barrens".

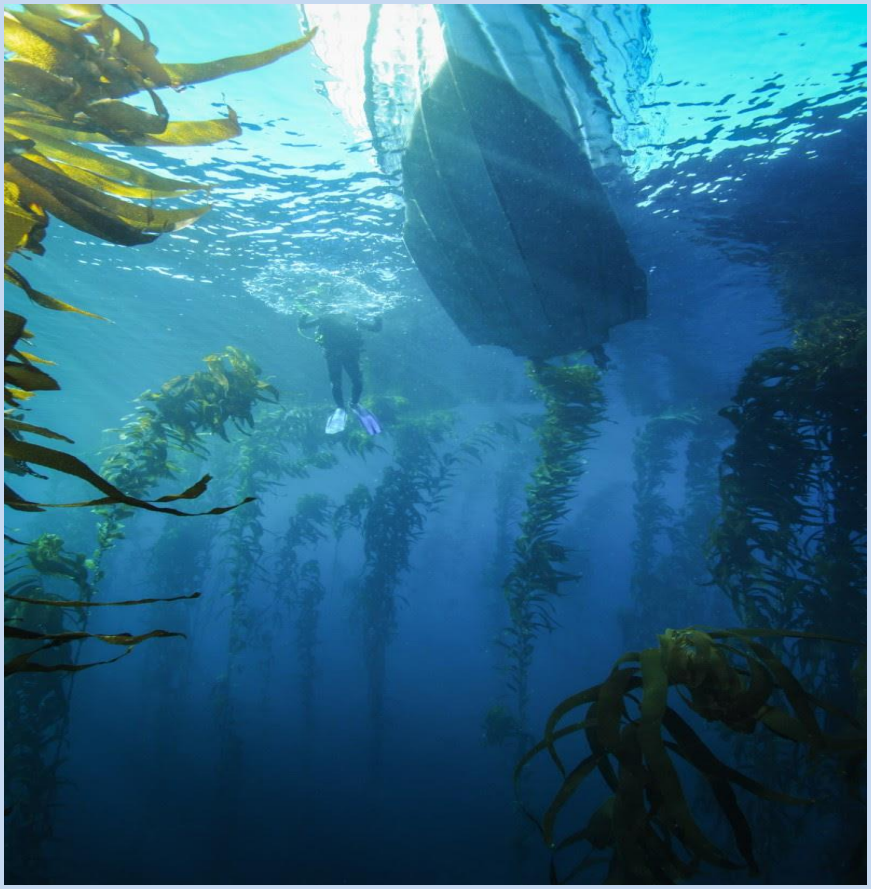
Even in the more stable USA there are warnings that the stability there won't last, the world's underwater kelp forests have their upper limits. "You can't take it from 55 degrees Fahrenheit to 80 degrees Fahrenheit and just expect it to do fine," Graham said. "You can't turn kelp into coral."

Voracious consumption by invading warm-water fish has also been linked to the loss or failure to recover of kelp forests in Japan.

There are success stories too. Water quality around some major cities has been improved. This allowed active restoration efforts to succeed and saw the return of crayweed forests to Sydney. Marine reserves, where fishing is prohibited, can also help to reduce the ability of warm-water species to colonise cooler habitats.

The same heatwave that killed the kelp also killed up to 90% of seagrasses in WA's World Heritage listed Shark Bay, which has since recovered only 7–20% of its historical averages. "This is a wake- up call", warns Wernberg. "It's important to take stock of what's at risk and understand what we can lose. Australian marine biodiversity is more than just the Great Barrier Reef". We're seeing changes in coral reefs, kelp forests, and mangroves – all coastal systems are starting to change.

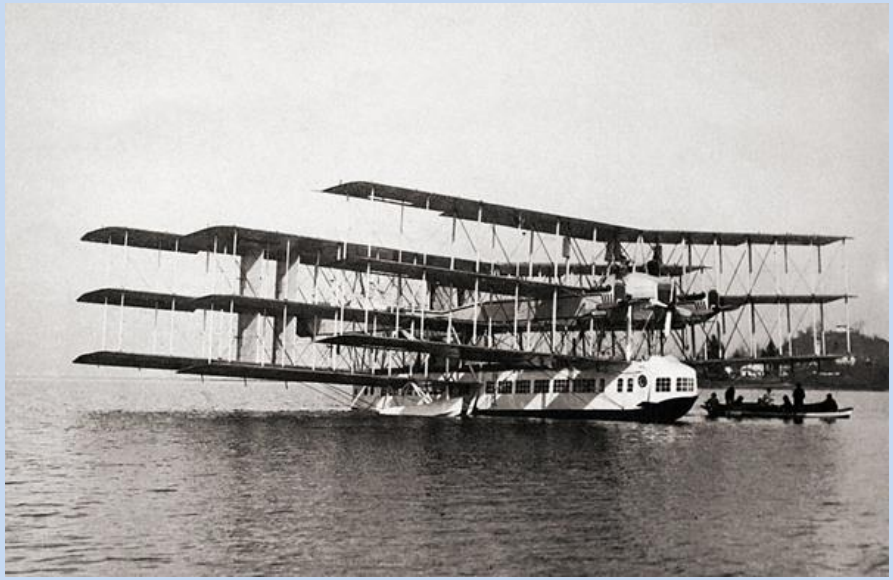
Ultimately, global action is needed to prevent further climate change impacts.



Giant kelp once spread 250 kilometres along Tasmania's east coast. Up to 45m tall, Macrocystis pyrifera fronds are the world's largest seaweed. The last east coast kelp forests in Lagoon Bay and Munroe Bight thinned and were then destroyed in a winter 2016 storm. Photo: Emma Flukes (nice one Em – excellent viz)

Born to Fail, the CA-60

So you know nothing about designing seaplane aircraft. Would you draw this up then try to build it with an expectation it would take to the air?



Well a world-leading Italian aircraft designer, Gianni Caproni, thought a 9 wing aircraft would be a good idea for a 100-passenger transatlantic flying boat. It featured eight engines and three sets of triple wings.

Only one example of this aircraft was built in 1921. Its maiden flight didn't last long. On its second flight it broke up after take off. No surprises there.

No Deadbeat Dad

Per ABC News

Handfish placed in an aquarium have shown some surprising behaviour, Dad helps with the childminding.

"Within half an hour of putting them in the tanks they began to exhibit pretty interesting courtship behaviour," marine research technician Tim Fountain said.

"The male, who we named Harley, followed around the female we named Rose, in the most appalling snivelling manner."He flattened himself right out, lowered his profile and sort of grovelled around after her.

Mr Fountain said while Harley was submissive to begin with, after spawning he quickly became dominant and protective of his brood. "We told everyone that the male had nothing to do with the parental behaviour after the spawning, which is completely wrong," he said. "We've now discovered that the male has been quite involved and it's shared parenting; prior to that it was believed the male would disappear after spawning." [I've certainly seen no males hanging around for red handfish breeding]

Senior CSIRO research scientist Tim Lynch, who is also working on the breeding program, said very little was known about the spotted handfish.

"I've always thought of them as a mystical beast, not many people have seen them … they're usually quite still when you see them in the wild," he said.

Pacific seastars arrived in Japanese ships in the Derwent in the 1980s and quickly degraded handfish habitat.

The CSIRO handfish captive breeding program was started to ensure the survival of the first marine fish to be listed as critically endangered.

"It's all about the conservation of the species," Dr Lynch said.

"Like most Tasmanian biologists, I'm somewhat haunted by what happened to the thylacine, so this program is saying 'let's do something about this'."

Dr Lynch said populations have become fragmented from each other and the species can only be found in the River Derwent and one spot in the D'Entrecasteaux Channel.

Harley and Rose will eventually be moved to Seahorse World to hopefully continue to breed and build an insurance population.

Algae of Temperate Reef

Giant kelp - This was once the dominant canopy plant in eastern Tasmania until the waters started to warm. It has gone from huge forests up to 30metres high to sporadic tufts intermittently popping up in the Derwent and thinning forests in the far south. The shadowy forest floor was once a microhabitat for a host of temperate species. It's pretty much just a memory.

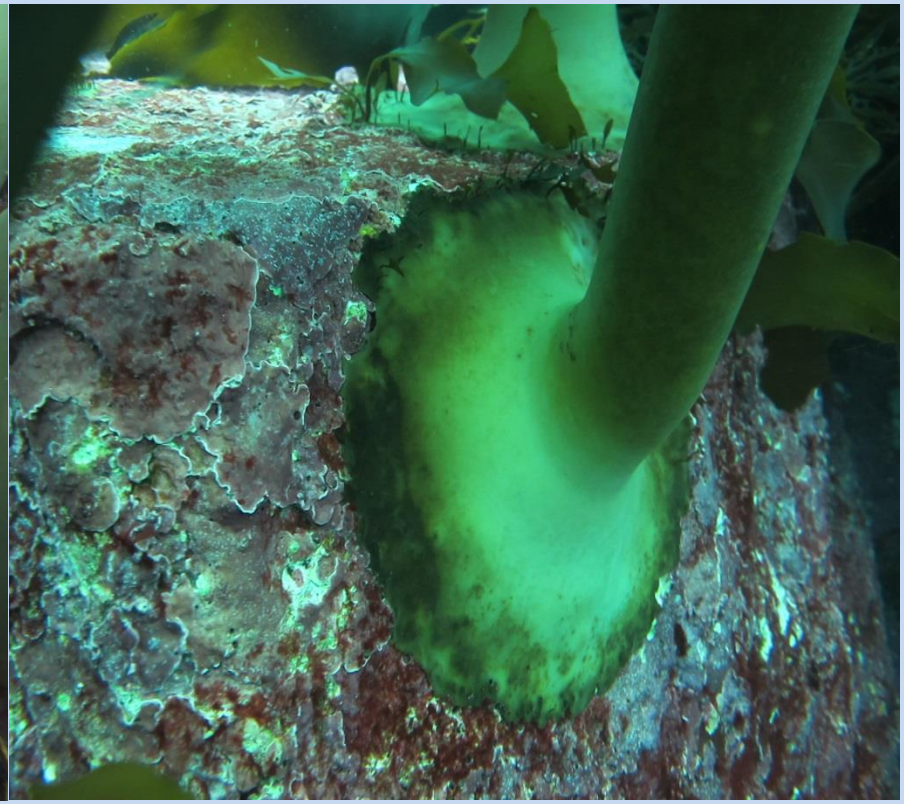
Strapweed – the bushy brown algae on the bottom is often a mix of species, but in Tassie usually dominated by strapweed *Ecklonia radiata*, or crayweed *Phyllosphora comosa*. Recognise these two species and you can name possibly half the seaweed on the reef by weight. Off Sydney, even this hardy ground cover has been wiped out by pollution. In WA, a heatwave saw the strapweed die over a vast stretch of coastline and the whole ecosystem may be changing to a more tropical set of species instead.

Carpoglossum Confluens
In amongst the huge swathes of strapweed are tufts of more novel brown algae. This alga often appears broken or damaged because of attacks from snails and other herbivores. It is found on subtidal rocky reef, to depths from 2 to 40 m across SE Australia. Seaweed can be harder than fish to classify and this is the first time I've noticed this plant in 45 years of diving. If the ocean is out of sight and out of mind, algae are even more so for many visitors to this underwater forest.

1. Red algae – This one is probably some species of Halymenia, but there are so many species. It could also be an introduced species. Many of the delicate red algae species can only be identified under a microscope. They prefer the low light of caves and cracks where the fast growing big brown algae offers less competition.

Caulerpa trifiaria – just like grass, this delicate green seaweed makes little meadows of underwater greenery in the spring, dying back over summer. It is often used as an egg attachment point for everything from snails to rare handfish.

No, this sponge is not a plant but an ancient animal that is stuck to the bottom, like most of the other things under this rock

Left: Bull kelp lives in the shallows and attaches to the rock in areas of heavy wave energy. Its thick and massive leathery fronds sweep away any competing weed, but they can't resist the hungry mouths of tiny little free-swimming crustaceans called amphipods that have drilled holes in the seaweed.
Right:Encrusting coralline algae – anywhere where bull kelp, the shade or wave energy clears the bottom of competing seaweeds an armoured crust of (usually pink) coral-like hard algae will carpet the bottom, a lurid background colour in a vivid underwater painting.

Seaweeds come in a variety of shapes, some are just "cool" to look at.