

ecologists and environmental scientists

tidings

Our Blueprint - A vision for the next 20 years



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*Regular readers will have followed **tidings'** recent transition of format and layout: a transition designed to reflect our development as a practice. In a related exercise, we have reflected on what it is that defines us as a practice. Whilst this exercise has enabled our team to sharpen its focus, its ultimate value will be in how it contributes to better client service.*

*With this in mind, I would like to share with you our 'blueprint': our distillation of what it means to be a part of the **frc environmental** team.*

What does **frc environmental do?**

We undertake rigorous science-based assessments of the aquatic environment ('deep thinking'); and provide related, substantial advice.

What are the benefits of **frc environmental's operation and approach?**

We provide a basis for sound management decisions. We do so in a manner that is of value to our clients.

Who does **frc environmental serve?**

All 3 levels of government, industry, conservation interests and ultimately the community.

What motivates us?

***frc environmental** provides an opportunity for us as individuals, collectively, and on behalf of our clients, to use science to influence the management of the aquatic environment.*

*Rigour, substance, value, influence. These are key words that not only describe **frc environmental**, but also serve to differentiate us from others.*

*In our August edition, I'll share with you the five attributes that define **frc environmental** – and that challenge each and every one of us every day, to achieve excellence.*

Sewage Effluent – Truly On the Nose?

Piped Effluent Encourages Tunnel Vision

The discharge of treated sewage effluent to the aquatic environment remains a focus for developing coastal communities. Nitrogen and phosphorus remain the elements of greatest concern, as these nutrients stimulate plant growth and have been implicated in the loss of seagrasses (due to shading by phytoplankton or algal smothering), and the stimulation of *Lyngbia* (fire weed) outbreaks and fish kills.

Whilst significant improvements in treatment are able to produce effluent with reduced nutrient concentrations, a growing population often means that the quantity of nutrients exported inevitably increases.

But as conspicuous 'point source' polluters, sewage treatment plants are commonly used as scape-goats for less obvious evils.

Over the past decade, frc [environmental](#) has been working with Whitsunday Shire Council to assess the true impact of treated sewage effluent on Pioneer Bay. Our studies have evolved from simple depth-distribution mapping of seagrass and the analysis of reef community structure, to consider the actual sources of nutrients used by the flora and fauna of the bay and adjoining waters. Along the way, simple and inexpensive innovations to the sewage treatment process, such as discharging treated effluent only on an outgoing tide,

have significantly reduced the level of sewage-derived nitrogen in seagrasses and algae within the bay.

But perhaps our most important 'realisation' to date is the value of keeping an open mind, and always looking for the 'bigger picture'. Seagrasses smothered by filamentous algae within sight of the point of treated sewage effluent discharge were surely evidence damning the discharge of treated effluent. But life is rarely simple. frc [environmental's](#) study of the seagrass and of the filamentous algae revealed that the primary nutrient source was not sewage related, but more likely from stormwater flowing to the bay via channels through dense fringing mangrove. Spending millions of rate payer's dollars to further reduce the nutrient concentrations of the treated sewage effluent, would do little to help the seagrass. Rather, the bay's ecosystem health is likely to benefit far more from the simple (and potentially far less costly) improvement of the catchment's stormwater infrastructure. In April / May frc [environmental's](#) team will return to assess the contribution of other less obvious sources of nutrient export to the bay.

For further information regarding the assessment and monitoring of effluent-related impacts, please contact Carol Conacher.



Effluent from the Cannonvale STP wells at the surface.



Floating filamentous algae caught on seagrass blades.



Stormwater flow through the mangroves may carry a significant nutrient load.

What else is out there?

Nine new species of jelly fish found in Moreton Bay!



Irukandji jelly fish: just 20 mm in diameter, but increasingly recognised as responsible for human deaths on the reef.

At a recent workshop on the marine flora and fauna of Moreton Bay, jelly fish taxonomist extraordinaire Lisa-Ann Gershwin from James Cook University discovered nine new species of jelly fish. Over 20 species of jelly fish have been recorded from Moreton Bay, including 'Morbakka' or 'Moreton Bay stingers', which are related to the renowned Irukandji jellyfish. None of the 9 new species from Moreton Bay can hurt humans (what a relief). Most of the new species were hydromedusae, or bell shaped jellies. According to Lisa-Ann one is an exquisite sparkly purple, another is very unusual in that it has black tentacles, and another has a conelike extension on its head, three red tubular tentacles and one long beaded tentacle! Lisa-Ann will return to Moreton Bay in April to investigate these new species more fully. It just goes to show that even on our own doorstep, we've only scratched the surface as far as knowing what lives 'beneath the waves'.

Enough is Enough: Managing Flows for the Barron River

Environmental flows must mimic nature if they are to protect ecosystem integrity

As many of you may be aware, the Department of Natural Resources and Mines has been working hard to complete Water Resource Plans (WRPs) for all of the major catchments in Queensland. WRPs are designed to plan for the allocation and sustainable management of water to meet Queensland's future water requirements, including the protection of natural ecosystems and security of supply to water users. Once finalised, WRPs are implemented as Resource Operations Plans (ROPs).

In order to protect aquatic ecosystems, ROPs make provision for environmental flows. The draft Barron River ROP required the release of 10% of the water currently used for power generation by Stanwell Corporation's Barron River Hydroelectric Power Station, which lies below the Barron Falls in the Wet Tropics World Heritage Area.

This release it was suggested, would benefit the aquatic ecosystems of the Barron Falls and Barron Gorge, downstream to where the extracted water is returned to the river. frc environmental was commissioned to consider the ecological basis for this requirement.

Through a rigorous framework of field study (targeting aquatic macrophytes, fish and

macro-invertebrate communities) and data analysis (including multivariate statistics), frc environmental found the ecosystems in the target reaches to be healthy and diverse. After a comprehensive review of previous studies of the river, and of the ecology of environmental flows, we determined that a lesser amount of water would maintain the ecological integrity of these target reaches. Indeed, as we went on to explain, the required release was likely to negatively impact the ecology of downstream reaches by providing an un-naturally consistent pattern of flow that would result in the permanent connection of onstream and offstream pools. This increased connectivity would lead to a decrease in both the diversity of habitats and in the availability of 'refuge' habitats (allowing key predators like the jungle perch to dominate the ecology of a greater number of pools).

In light of the results of our study, DNRM amended the (now finalised) ROP reducing the amount of water required to be released from the weir serving the power station. Monitoring will continue to assess the effectiveness of the revised flow regime.

For further information regarding the assessment of stream ecosystem health, please contact frc environmental's Lauren Thorburn or Dr John Thorogood.



Stanwell's Ian Bridge assessing water levels in the Barron Gorge after a trial 'maximum' release of water from the Kuranda Weir.



frc's Dr John Thorogood 'kick sampling' a bed habitat in an offstream pool, downstream of the Barron Gorge Power Station.

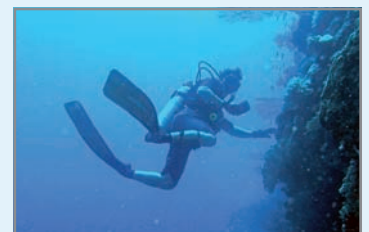
Solomon Islands

Diving, spearfishing and hiking were the focal points for Andrew's recent trip through the Western Province of the Solomon Islands. The journey began in the villages of Marovo Lagoon, the largest double barrier lagoon in the world and a 'hot spot' for marine biodiversity. Andrew also visited Roviana Lagoon and the remote islands of Hele and Tetepare. Tetepare is the largest permanently uninhabited island in the Pacific.

Highlights of the trip include: diving the endless coral walls of Marovo Lagoon and the Hele Islands; hiking to an ancient fortified village near the summit of Mt Mariu, the 2900 foot jungle clad peak of Gatokae Island; and diving through a limestone island in a traditional 'shark-calling' cave near Roviana Lagoon.



Beach and Lagoon at Peava Village on Gatokae Island.



Diving a vertical coral wall at an entrance to Marovo Lagoon.

Pests in Paradise

Mosquito and Biting Midge Management are Integral to Successful Coastal Development

Residents of coastal regions are well aware of the impact that mosquitoes and biting midges can have on outdoor recreation. Apart from the irritating bites, mosquitoes can also affect our health by transmitting arboviruses such as the debilitating Ross River virus, and the lesser known Barmah Forest virus. In tropical Queensland, mosquitoes also carry Dengue Fever. Midges in Australia are not known to be vectors of any human diseases, but they have been linked to the transmission of veterinary arboviruses such as 'bluetongue' and 'akabane'.

Mosquitoes and midges breed in moist areas or areas of pooled water. Coastal areas (especially wetlands) are the breeding habitats for the major pest species of mosquito and biting midge, including those that carry arboviruses. Mosquitoes and biting midges are becoming an increasing problem in regions such as coastal Queensland and northern New South Wales, as residential development focuses on land ever closer to remnant wetlands.

Most local authorities have mapped, and subsequently treat, mosquito breeding habitat (by helicopter, quad-bike or on foot) on crown land with biological control agents that prevent the development of larval mosquitoes. Unlike the chemicals used to control mosquito breeding into the late 1980s, these treatments have minimal impact on non-target species. The control of biting midges is less well-advanced, as residents of some canal estates and coastal communities can attest. An Australia-wide review of mosquito and biting midge control undertaken

by frc [environmental](#) on behalf of the then Queensland Commercial Fishermen's Organisation revealed that effective midge control agents were actually far more effective at crab larvae 'control'.

Careful attention to elements of both site layout and structural design of a residential development can significantly lessen the impact of mosquitoes and biting midges. Not only can breeding habitat be minimised, but roosting and migration into the development can be discouraged. For example, dense vegetation can provide roosting (resting) habitat for mosquitoes and biting midge. Consequently, the incidence of mosquitoes and biting midges within residential areas can be minimised by providing sparsely vegetated buffer zones (including public open space / playing fields) between known breeding sites and residential areas. Where a development incorporates a lake or other water feature, mosquito and midge breeding can be effectively managed through the regulation of water depth, use of edge treatments that don't retain water, and stocking of the waters with larvivorous native fishes.

Residents severely affected by mosquitoes or biting midges can be almost as irritating to developers and local authorities as the small beasts themselves. A development that intelligently incorporates mosquito and biting midge issues into the design will lead to happier and healthier residents, and a reduced need for (costly) biological or chemical control. To further discuss site-specific mosquito and biting midge management plans, please contact frc [environmental's](#) Dr John Thorogood.



A visit to the 'blood bank' will enable this female mosquito to lay a vigorous batch of eggs.

Marine, Estuarine and Freshwater

Survey, impact assessment, monitoring and environmental management

- water and sediment quality
- fisheries science
- saltmarsh, mangrove and seagrass
- benthic invertebrate ecology
- reef ecology
- wetland rehabilitation
- mosquito and midge management
- coastal zone and riparian management
- environmental flows
- river health bio-assessment (inc. AusRivAS)
- stable isotope tracking of effluent



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