



# Clean Marina Program

## Re-Accreditations

Congratulations to **Royal Queensland Yacht Squadron** on their recent reaccreditation and we will shortly also be pleased to announce their 'Fish Friendly Marina' achievement.

And in Singapore, congratulations to **Marina at Keppel Bay** and **Sentosa Cove Marina** which both successfully reaccredited following audits conducted at the end of April.

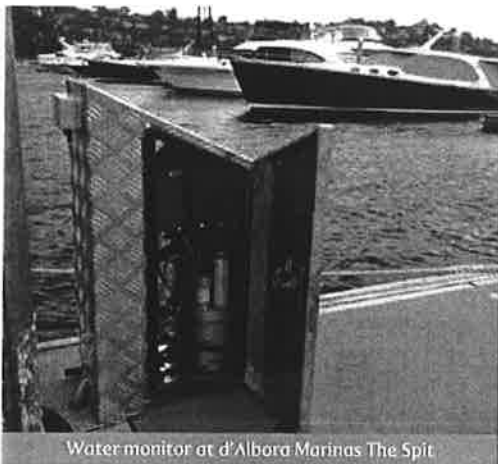


Coffs Harbour Marina proudly celebrating its recognition as a 'Fish friendly Marina' at the presentation on Friday 20 March - congratulations again and pictured are (l-r) Craig Williams, marina maintenance manager; Colin Bransgrove (MIA); Elise Currey, marina manager; Nicola Johnstone - Solitary Islands Marine Park manager and Stephanie Alderman - marina admin.

## Monitoring water quality a priority for Sydney Harbour

Sydney Harbour is a wonderful asset used for recreation, commerce, and the drainage of the Sydney land catchment.

However pollutants such as heavy metals and dioxins caused by a century of dumping industrial waste into the harbour and its tributaries lurk in sediments on the harbour floor. Even though dumping has now stopped, the previous pollutants remain. When there is heavy rain the flow of water increases and this re-suspends the sediment. The harbour turns brown and the pollutants are dissolved in the harbour water. The rain also brings nutrients into the harbour which provide the nitrogen, phosphorus and other chemicals which are needed for plant life to grow. After mild rain fall events, the upper harbour turns green as a result of the phytoplankton in the water prospering.



Water monitor at d'Albora Marinas The Spit

Daniel Harrison and Professor Gavin Birch from The Sydney Institute of Marine Science, located at Chowder Bay on the Harbour, are leading the development of a sensor package able to measure the important harbour properties and send them using the 3G phone network to the institute server. Daniel, a PhD student in Oceanography at the University of Sydney designed the prototype and was assisted to bring it to production by another PhD student in the department of Electrical Engineering. The first deployment has been made at d'Albora Marinas - The Spit being overseen by Clemens Overdijk, Marina Manager.

The project is also interested to hear from other marinas in Sydney Harbour who are willing to host one of the sensors in order to expand the monitoring network.

In early May, 2015 there was a once-in-18-year rain event and the effects on the harbour can be seen in the sensor record at The Spit. The salinity of the water (a measure of saltiness) and temperature show a dramatic decrease as the cold, fresh rain water enters Middle Harbour and travels towards Sydney Heads. The turbidity (cloudiness of the water) and CDOM (dissolved organic material) show a rapid increase. While the chlorophyll (a measure of plant phytoplankton) decreases as the fresh water pushes the plankton out to sea, however in the days and weeks following the storm as the new nitrogen and phosphorous are absorbed by the plankton in the water column, they increase again turning the water green and feeding the

small pelagic fish, oysters and other marine life.

The sensors by themselves would not allow an understanding of the complex response to an event such as this storm. These measurement stations need to compare with a computer model of the harbour. Such a model is being developed at the University of Sydney by professor Ian S F Jones and PhD student Edwina Tanner in the School of Geosciences. The model can change things such as the rate the rain water enters the harbour or the amount of sediment trapped. The impact can be assessed and the cost benefit analysed before undertaking expensive engineering works designed to improve the water quality in the harbor.

In coming stages of the collaborative project, the Sydney Institute of Marine Science and the University of Sydney are working to make the data from both monitoring stations and computer model output available to the public and to the scientific community through the project website. <http://www.sydneyharbourobservatory.org/>

This work was supported by a grant from the Sydney Institute of Marine Science Foundation, as part of the Sydney Harbour Research Project, and funds contributed by the Hawkesbury Nepean Catchment Management Authority of NSW.