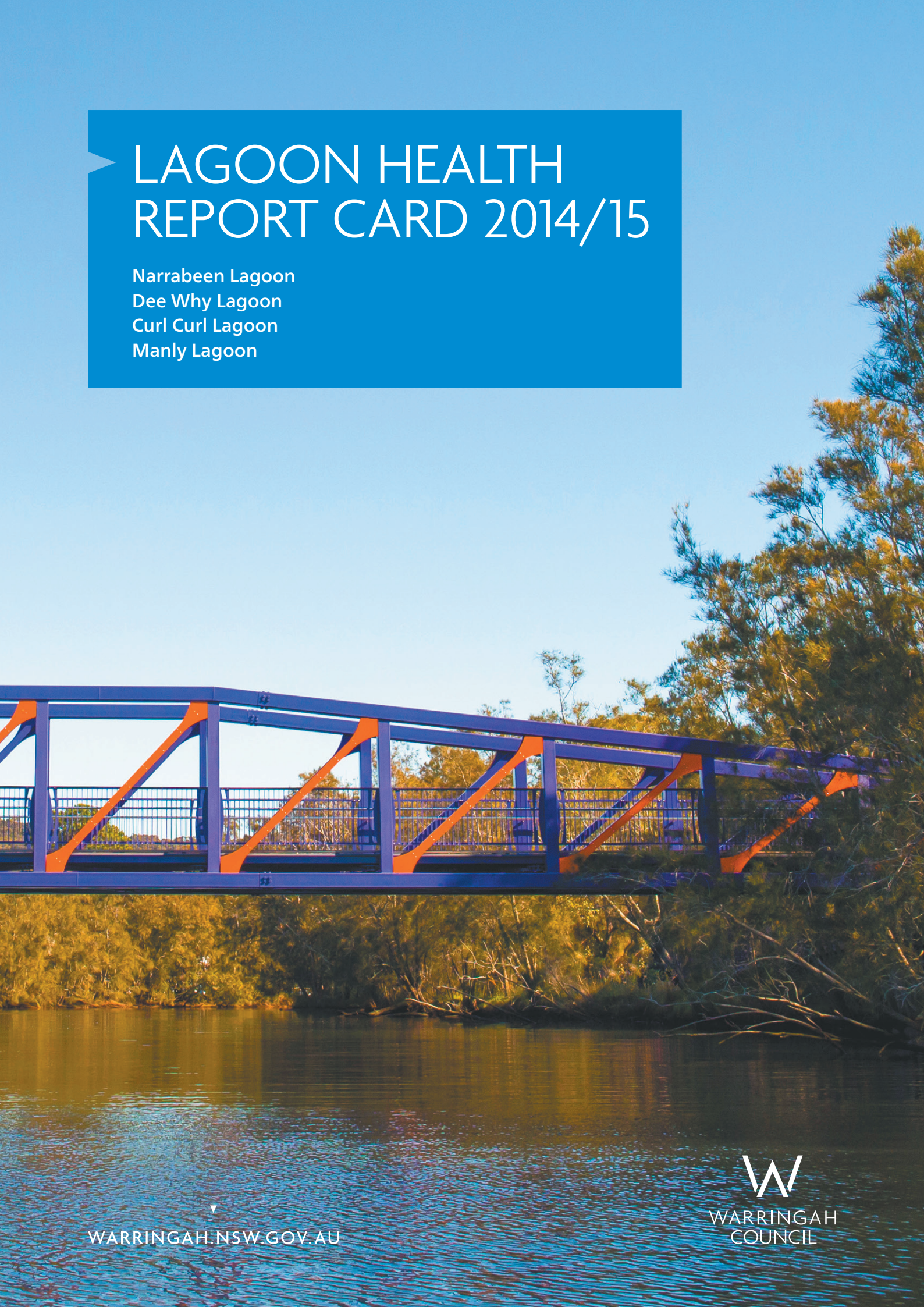
LAGOON HEALTH REPORT CARD 2014/15

Narrabeen Lagoon
Dee Why Lagoon
Curl Curl Lagoon
Manly Lagoon



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Contents

KEY MESSAGE 2014/15

The quality of the water in our lagoons is strongly related to rainfall. Lagoon condition rankings this year reflects the wet spring/summer season of 2014-15 which delivered more fine sediment and nutrients to our waterways than the previous years.

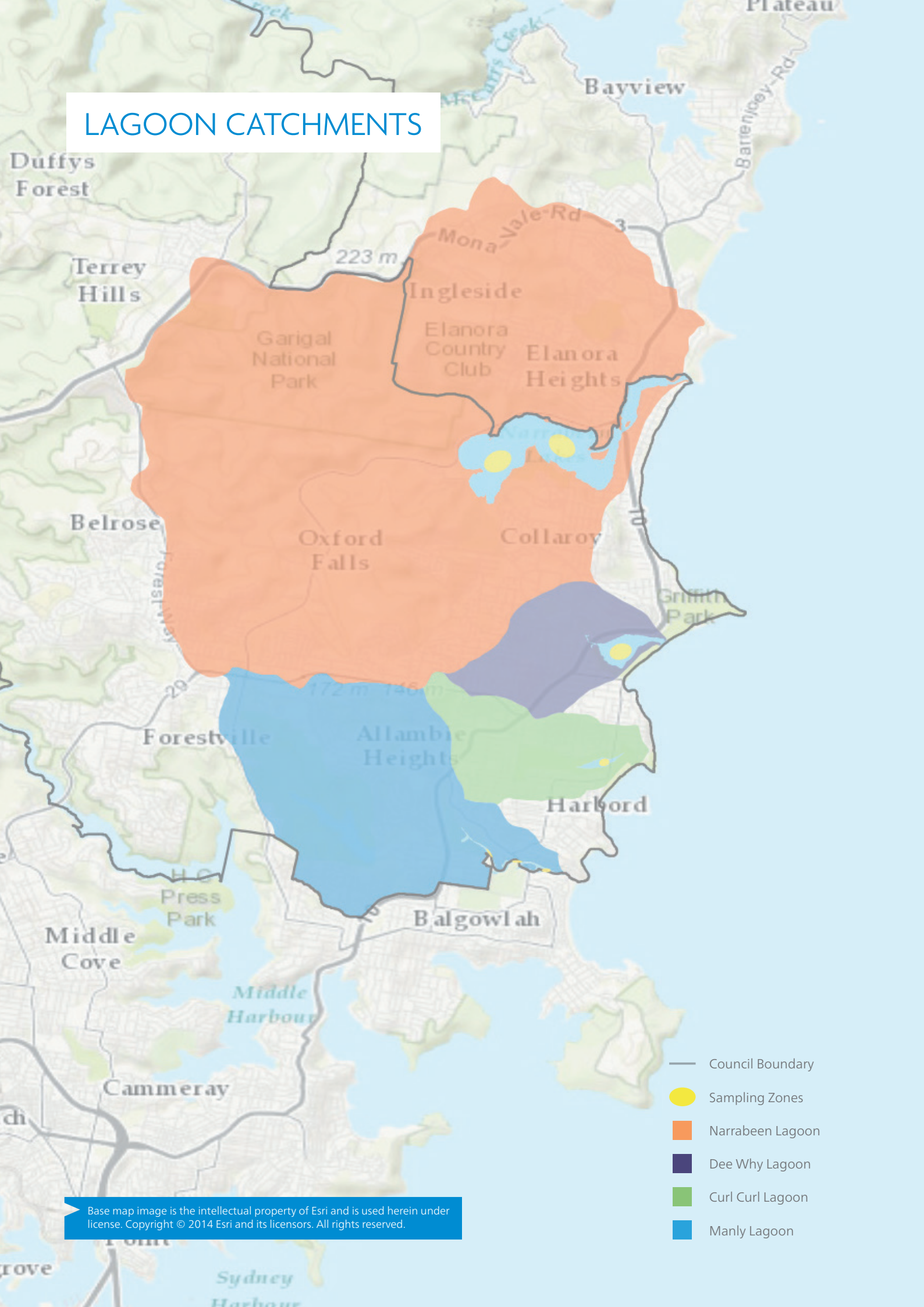
For this reason, Narrabeen and Dee Why dropped back to a Grade C. Curl Curl remained a Grade D and Manly remained a Grade C.

It is important to appreciate that our lagoons are directly connected to our catchments, and our catchments are highly modified from decades of development. The loss of bushland to urban development has increased the amount of stormwater delivered into our lagoons, and uncontrolled soil running off modified parts of the catchment is a major source of pollution.

Therefore it's of no surprise that our lagoons are affected by stormwater and its contents, meaning their ecological condition can change from year to year. To give our lagoons the best chance at coping with the pressures of our urban environment it is important to be watchful. When you see muddy water flowing down a gutter or in our stormwater channels, please call Council and let us know. If you come across what smells or looks like a sewer leak contact Council and Sydney Water.

If we all keep a watchful eye on what is entering our waterways it gives our rangers the best chance at investigating the source and minimising the impacts.

LAGOON CATCHMENTS



OVERVIEW

Estuaries are as diverse in their physical form as they are in their state of health.

Warringah's estuaries are a unique type of estuary known as 'Intermittently Open and Closed Lake or Lagoons', or ICOLLs.

Our lagoons differ in shape, size, depth and catchment type, but they share the burden of urbanised catchments which deliver a range of pollutants and nutrients during wet weather. These inputs influence their ecological health.

So it is no surprise that lagoon condition can change from year to year depending on how wet or dry the year was. A wetter year means more pollutant inputs and more lagoon breakouts.

THE YEAR THAT WAS

WET WET WET

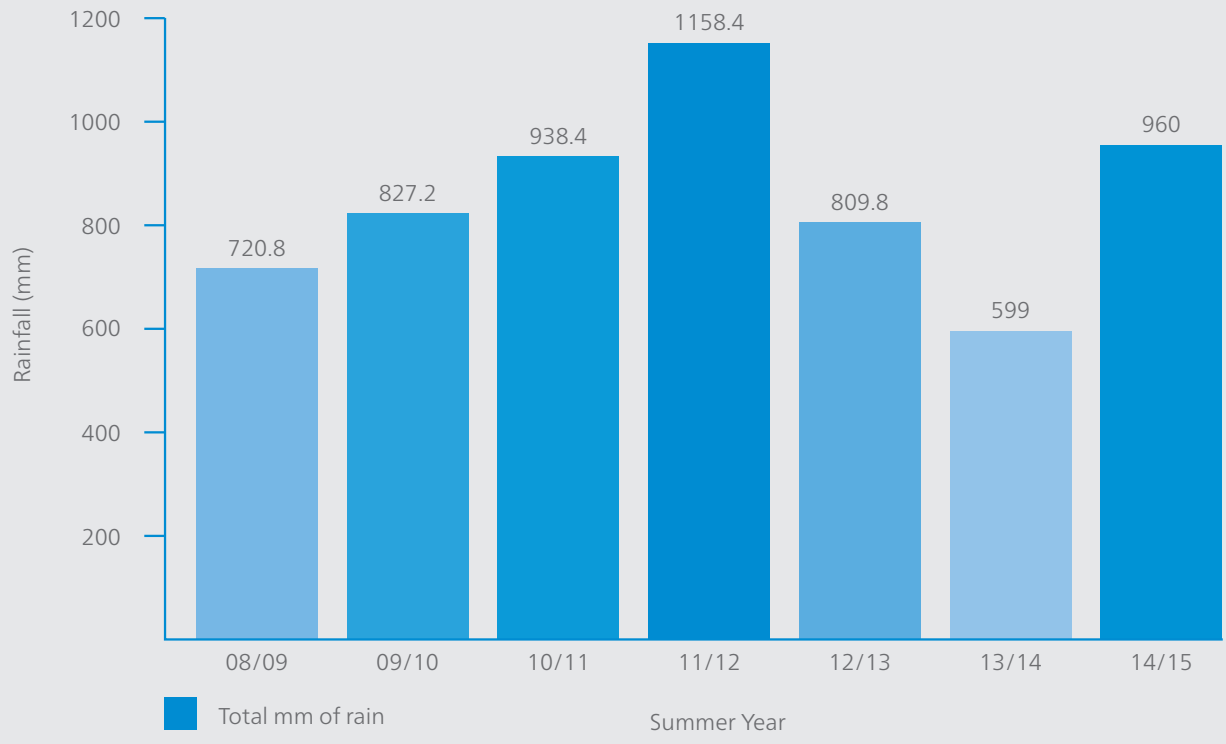
The 2014 - 15 monitoring year was very wet compared to the last 2 years with Warringah receiving frequent and often large and heavy rain events over the sampling period.

The sampling season ended with the wettest April in 25 years associated with the East Coast Low that caused widespread damage across Warringah and greater Sydney.

Prior to that, there was also another East Coast Low back in October 2014, heavy and persistent rainfall from 1 - 11 December, and again at Christmas time. This was accompanied by a very wet January, with large rainfall events throughout the month.

Unfortunately the more rain we received meant more nutrients and more sediments entered our waterways.

WARRINGAH LGA SUMMER RAINFALL
(October - April Belrose Bureau of Meteorology station)



METHOD

THE GRADES EXPLAINED

A

EXCELLENT

The indicators meet all benchmarks almost all of the year. Equal to the best 20% of scores in NSW.

B

VERY GOOD

The indicators meet all benchmarks for most of the year. Equal to the next 30% of scores in NSW.

C

FAIR

The indicators meet some benchmarks for part of the year. Equal to the middle 30% of scores in NSW.

D

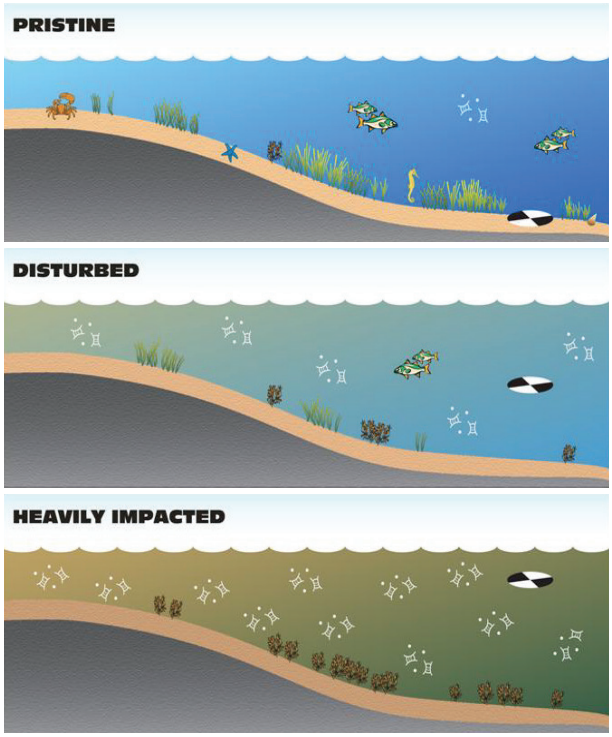
POOR

The indicators meet few benchmarks for part of the year. Equal to the next 15% of scores in NSW.

E

VERY POOR

The indicator almost never meet benchmarks all of the year. Equal to the worst 5% of scores in NSW.



Source: OEH

These grades allow us to compare our lagoons with the lagoons, estuaries and river mouths that the NSW Office of Environment and Heritage has been monitoring all along the NSW coast.

HEALTHY ESTUARIES IN NSW

This Report Card is reporting on Ecological Health. Estuarine ecosystems are complex living environments with communities of plants, animals and micro-organisms all living together and interacting with one another.

This busy community of living creatures have a very important job in maintaining a healthy waterway. They all work together to process nutrients coming off the catchment. The indicators used to determine the Report Card grades are measures of the performance of these processes in an estuary.

The indicators used to measure the ecological health of the lagoons don't tell us anything about the suitability of the water to swim in or to drink from. There are other programs in place to determine this type of health such as NSW Beachwatch.

To see recreational water quality data for our beaches go to Beachwatch at **www.environment.nsw.gov.au/beachapp/oceanbulletin.aspx?NoMobile**

Lakes and lagoons that are intermittently closed and open (like the lagoons in Warringah) are often not suitable to swim in after rain, as stormwater flows into them. Stormwater contains many types of pollutants including bacteria, so water quality in these waterways is quickly affected. Beachwatch recommend that you avoid swimming during heavy rain and at least one day after heavy rain at ocean beaches, and for at least three days at harbour beaches, due to the possibility of pollution from stormwater drains.

The 'ideal situation' for NSW estuaries includes intact aquatic habitats like seagrass, aquatic plants and riparian vegetation, minimal algal blooms, and minimal sediment inputs.

The vision for our waterways is to maintain or improve their condition in order to protect biological diversity and maintain ecological processes.

For more information contact:

Natural Environment Unit
Warringah Council
9942 2111

Estuaries and Catchments
NSW Office of Environment
and Heritage
9995 5496

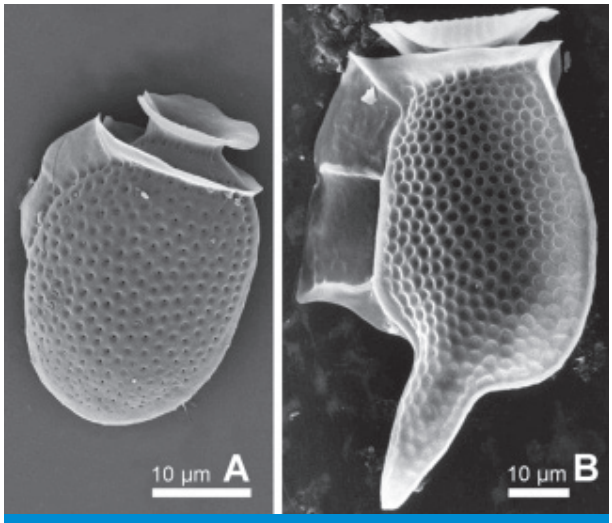
Full details of the NSW MER Program can be found in Roper et al 2011 on www.environment.nsw.gov.au.
Data analysis and interpretation by ECU.

DID YOU KNOW

CHLOROPHYLL WHAT?

We measure *chlorophyll a* and turbidity or water clarity to get an understanding of how our lagoons are processing the nutrients stormwater is delivering to the waterway. So what is *chlorophyll a* and what does it represent? *Chlorophyll a* is a green pigment found in plants. It absorbs sunlight and converts it to sugar during a process called photosynthesis. *Chlorophyll a* is contained in chloroplasts which are the specialised compartments in plants cells carrying out photosynthesis in microalgae or phytoplankton.

Therefore, *chlorophyll a* concentrations are an indicator of phytoplankton abundance in coastal and estuarine waters. It is natural for *chlorophyll a* levels to fluctuate over time. *Chlorophyll a* concentrations are often higher after rainfall, particularly if the rain has flushed nutrients into the water. Higher *chlorophyll a* levels are also common during the summer months when water temperatures and light levels are higher.



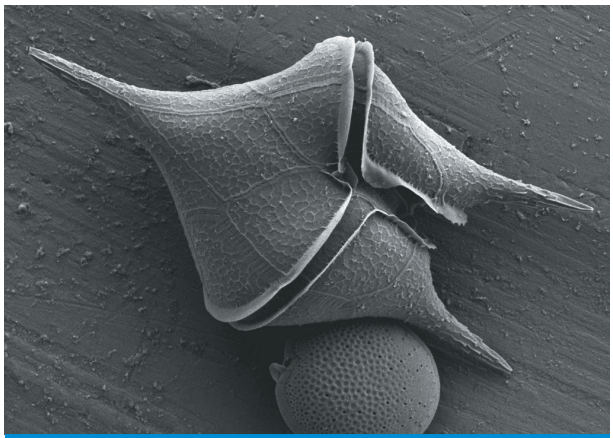
A: SEM micrography of Dinophysis acuminata.
B: SEM micrography of Dinophysis caudata.
Eugenia et al. 2012. Bol. Soc. Argent. Bot. vol.47 no.1-2

PHYTO WHO?

What is phytoplankton?

Phytoplankton are microscopic plants which live within the water column. The amount of phytoplankton (called biomass) and the number of different species (diversity) are influenced by many factors. These include the depth and shape of the lagoon, the way the water moves around the lagoon, and the amount and types of nutrients which enter the lagoon through stormwater and groundwater.

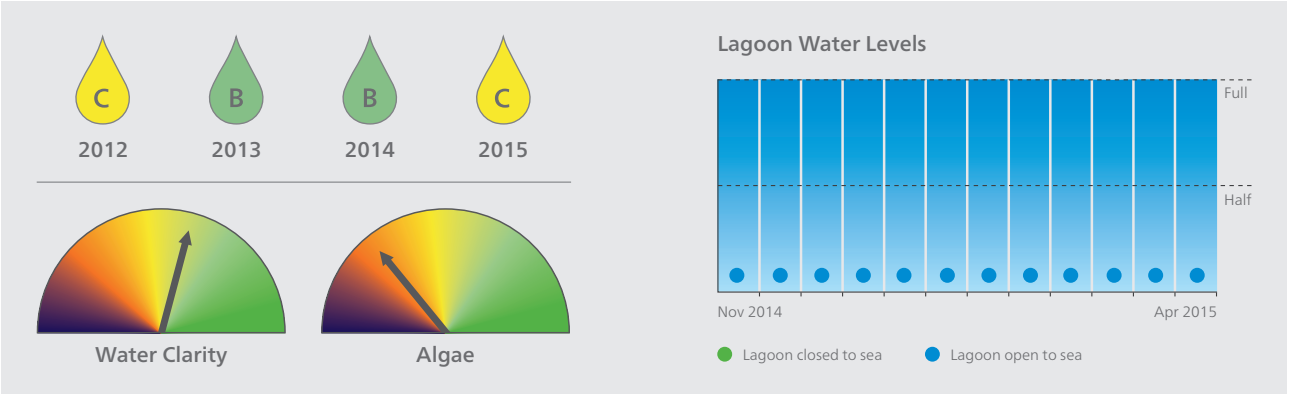
Ceratium furca – showing high density of chlorphyll a (Protists Information Centre 1995-2014)



Protoperidinium concinnum, especie descrita originalmente en 2006 de las aguas de la Corriente del Golfo de Carolina del Norte, fue encontrada también en Veracuz y Yucatán.

RESULTS

NARRABEEN LAGOON

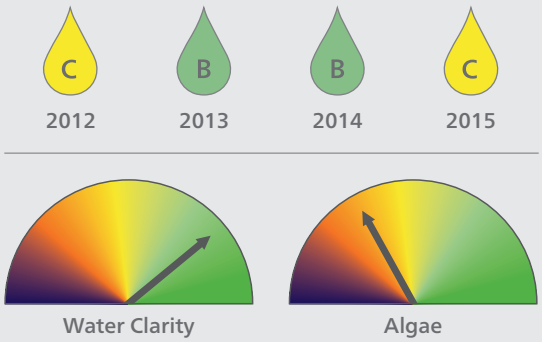


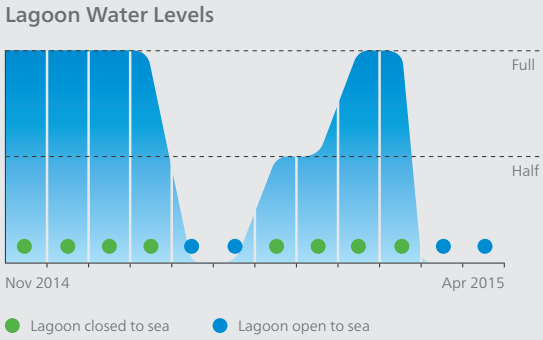
Narrabeen Lagoon showed similar characteristics to 2013-14 with generally clear water.

However the frequent and often large rain events, in particular the East coast low of 14-15 October, delivered significant pulses of turbid and nutrient rich water via the three main creeks of the catchment, Deep, Middle and South Creek.

Hence there was an increase in the average algae (chlorophyll-a) concentration this sampling period compared to last, which was the major cause behind the decrease in the overall water quality grade compared to last year.

DEE WHY LAGOON



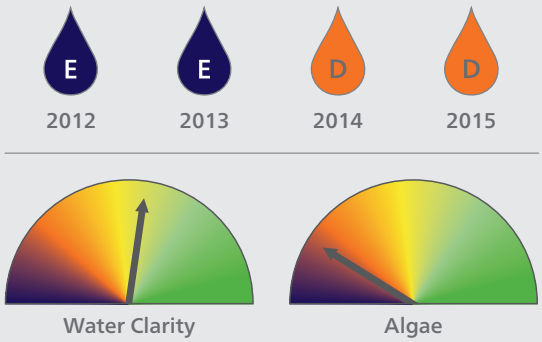


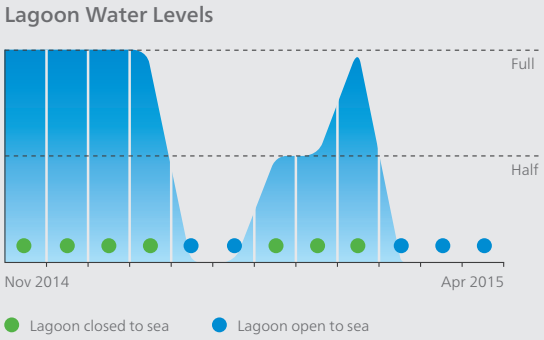
Water clarity was worse than last year and there was an increase in algae.

These declines in both indicators subsequently lead to a decrease in the overall grade.

The lagoon broke out three times during the sampling period but the sand on the beach quickly reformed into a berm or barrier, maintaining lagoon water conditions rich in nutrients from recent rains.

CURL CURL LAGOON



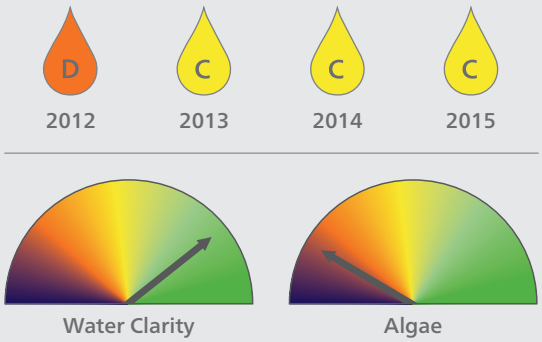


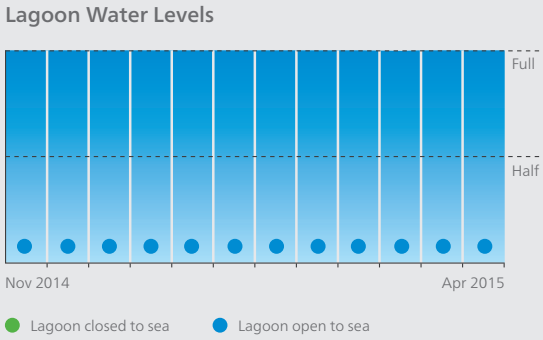
Water clarity for the 2014/2015 sampling period was better than that of the previous sampling period, leading to an improvement in the turbidity grade, however algae (chlorophyll-a) concentrations throughout the 2014/2015 sampling were generally very high, which is typical for this lagoon as it receives nutrient rich groundwater and stormwater.

The positive gains in water clarity were outweighed by algae concentrations which has kept the overall grade the same as the previous sampling period.

Curl Curl Lagoon receives groundwater that becomes rich in nutrients as is flows through the landfill which surrounds the lagoon. The nutrients are readily available for micro algae to consume, hence algae levels in Curl Curl are regularly high.

MANLY LAGOON





Water clarity in Manly Lagoon was similar to last year. There was a small increase in average algae (chlorophyll-a) concentration compared to last year.

Algae concentrations were consistently high over all three zones on almost every sampling event. This is natural response to nutrient influx from rain events.

During the dry periods, algae growth is encouraged with hot summer temperatures and sunny days which provide the ideal conditions. The increase in algae did not impact the overall grade, due to the positives of the good water clarity readings.

HOW CAN I HELP IMPROVE LAGOON HEALTH IN MY COMMUNITY?

- Report pollution events to Council on 9942 2111
- Join a bushcare group - find out from Council how you can get involved to help reduce the number of exotic and invasive plants, particularly in urban areas.
- Sweep your gutter and driveway regularly and place the sweepings on the garden, in the compost or rubbish/vegetation bin to avoid it being washed down the drain and into our creeks.
- Plant native species in your garden and avoid invasive weeds.
- Avoid unnecessary use of fertiliser on your property. Fertilisers are easily washed into creeks and result in elevated levels of nutrients which can have a number of knock on effects.
- Avoid large-scale clearing of vegetation and stabilise by replanting areas of disturbed soil. This will help prevent erosion of creek banks and reduce sediment and nutrient entering into streams.
- Try and use ecofriendly cleaning products that are free from phosphates.
- Ensure only rain water goes down the stormwater drain. Wash paint brushes in the sink.
- Wash cars on the lawn and minimise detergent use. Empty the soapy water down the sink or toilet. Even better, take the car to a car wash where the water gets treated and recycled.
- Install a rainwater tank to water your garden, flush your toilets or connect to your washing machine.
- Clean up pet droppings and dispose of them in the rubbish bin or in the toilet.
- Consider natural alternatives to pest control chemicals in the garden.
- Make sure your household sewerage pipes are not connected illegally to stormwater.

- Replace impermeable surfaces (e.g. concrete) with permeable surfaces such as timber decks and pavers (with gaps between pavers) to allow rainwater to infiltrate into the ground.
- Maintain your car, making sure there are no oil leaks.
- Pick up litter and be mindful of how you dispose of your rubbish and where it ends up.
- Report any invasive plants that you notice while out walking.

GROSS POLLUTANT TRAPS

Council continues to maintain the Gross Pollutant Traps in all the catchments. When these devices get overloaded during heavy rain events, bottles and other floating rubbish can often escape and travel down the creeks into the lagoons.

By being mindful of your rubbish and your drink bottles, especially on playing fields during weekend sport, the foreshores of our lagoons have a better chance of staying cleaner.

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