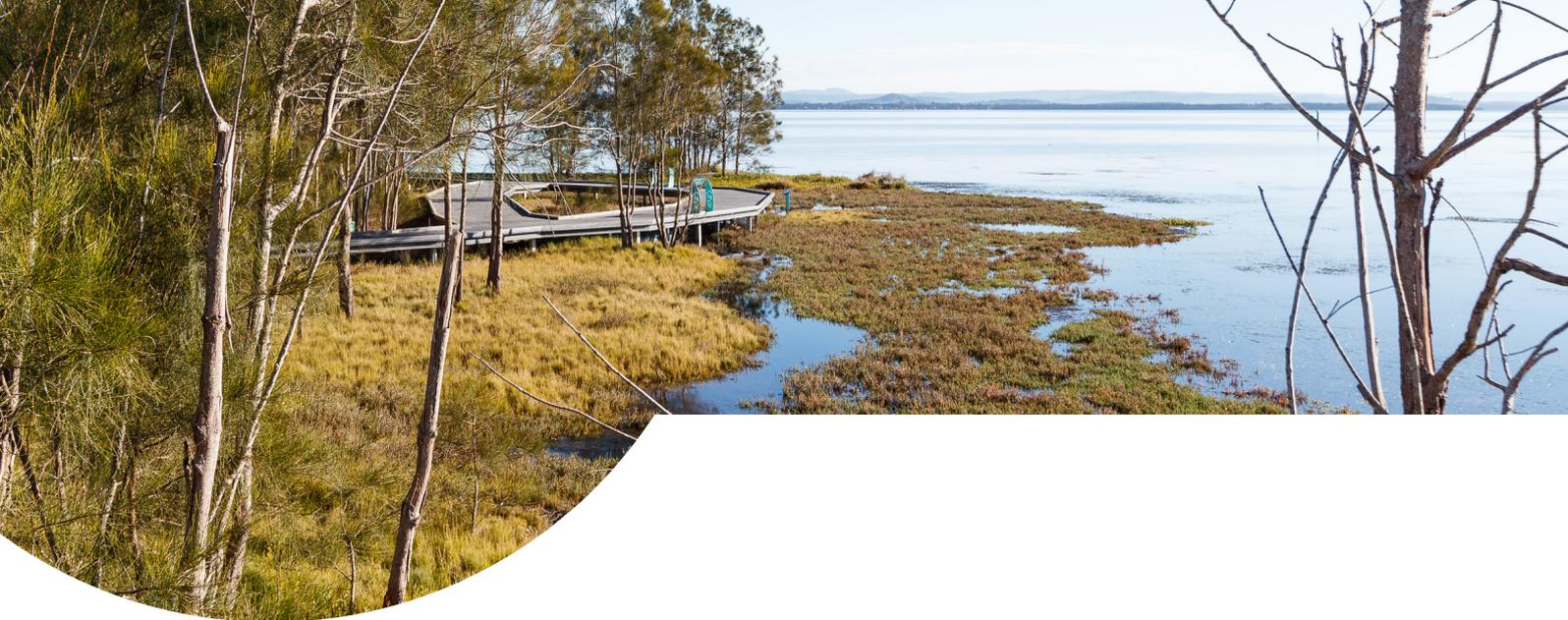


Central
Coast
Council

Central Coast Waterways report card 2017-18



central coast
waterways



Introduction

This is the first combined report card for waterways of the Central Coast Local Government Area. It includes the estuarine areas of Southern Lake Macquarie, Tuggerah Lakes, Brisbane Water and the major coastal lagoons - Wamberal, Terrigal, Avoca and Cockrone. Future Report Cards will incorporate the Lower Hawkesbury and the freshwater catchments. The ecological health data presented here were collected throughout 2017-18.

Central Coast Council monitors the ecological health of our lakes, estuaries, rivers, creeks and lagoons to evaluate condition, measure change through time and target investment and on-ground works to improve ecosystem health. A healthy waterway is one that supports natural processes, is resilient to change, can recover from human impacts, and is relatively stable and sustainable through time.

By reporting the monitoring results to the community each year, Council aims to raise awareness about the state of our waterways, and the pressures that affect ecological health.

Waterways make up 13% of the total area of the Central Coast - they traverse our landscapes from the catchments to the coast and are ours to use, share and protect.

Central Coast waterways

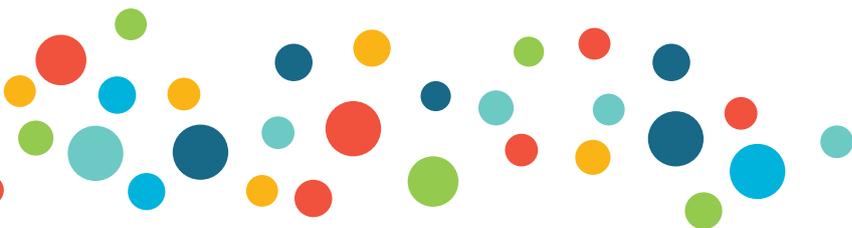
The Central Coast Local Government Area is located on the east-coast of New South Wales between Sydney and Newcastle. It is one of the largest Council areas in NSW covering an area of 1,845 km².

The Central Coast's waterways form part of the NSW marine estate, and are managed through implementation of Estuary and Coastal Zone Management Plans.

From the southern shores of Lake Macquarie and the valleys and floodplains of Tuggerah Lakes to the delicate coastal lagoons, rugged Brisbane Water and the shores of the mighty Hawkesbury - the Central Coast's waterways are extensive and unique. They connect our natural landscapes, carrying water from the catchments to the coast and supporting a range of important environmental, social and cultural values and uses. The health and beauty of our waterways is vital to our region's strong tourism industry and our local identity.

Community Strategic Plan

The value the community places on our local waterways was demonstrated through the development of the Community Strategic Plan (2018-2028). Maintaining environmental resources for the future and cherishing and protecting the natural beauty of the Central Coast were highlighted as key focus areas for the Central Coast.





Methods

The Central Coast Waterways report card is like a health check for our estuaries: it compares current ecological health with ideal estuary health and can be used to track changes over time.

The program is designed to be consistent with the NSW Natural Resources Monitoring, Evaluation and Reporting (MER) Program and to address locally relevant issues. By following the MER protocols, waterway ecological health can be compared to other estuaries throughout NSW.

Our scientists measure turbidity, chlorophyll-a and seagrass depth range at each of the sampling sites. These tell us about how the ecosystems are performing in response to catchment pressure. The results are compared to established trigger values for each estuary type – lake, lagoon or back dune lagoon – and are used to calculate the water quality grades.

- T** **Turbidity** is a measure of water clarity or cloudiness. Elevated turbidity is caused by more sand, silt, clay and microalgae suspended in the water. Long periods of high turbidity will negatively affect estuary health.
- C** **Chlorophyll-a** is an indicator of levels of microalgae and nutrients in the water. High levels of chlorophyll-a indicate high inputs of nutrients which can lead to algal blooms and a decline in water quality.
- S** **Seagrass depth range** is a biological indicator of water clarity over longer time periods. Seagrass grows slowly and depends on high water clarity, good access to sunlight and relatively low nutrient concentrations to survive and thrive.

The water quality grade for each indicator is used to calculate an overall grade for each site. Sites are selected to represent the surrounding area. Healthy estuaries generally have low levels of microalgae and turbidity, and strong seagrass communities.

Ecological health is used to describe the current state of the environment, and how that compares to an ideal state as set out in the relevant management objectives and plans.

Ecological health does not refer to environmental health issues such as drinking water quality, safety for swimming, heavy metal contamination, disease, bacteria, viruses or our ability to harvest shellfish or fish.

The grades explained

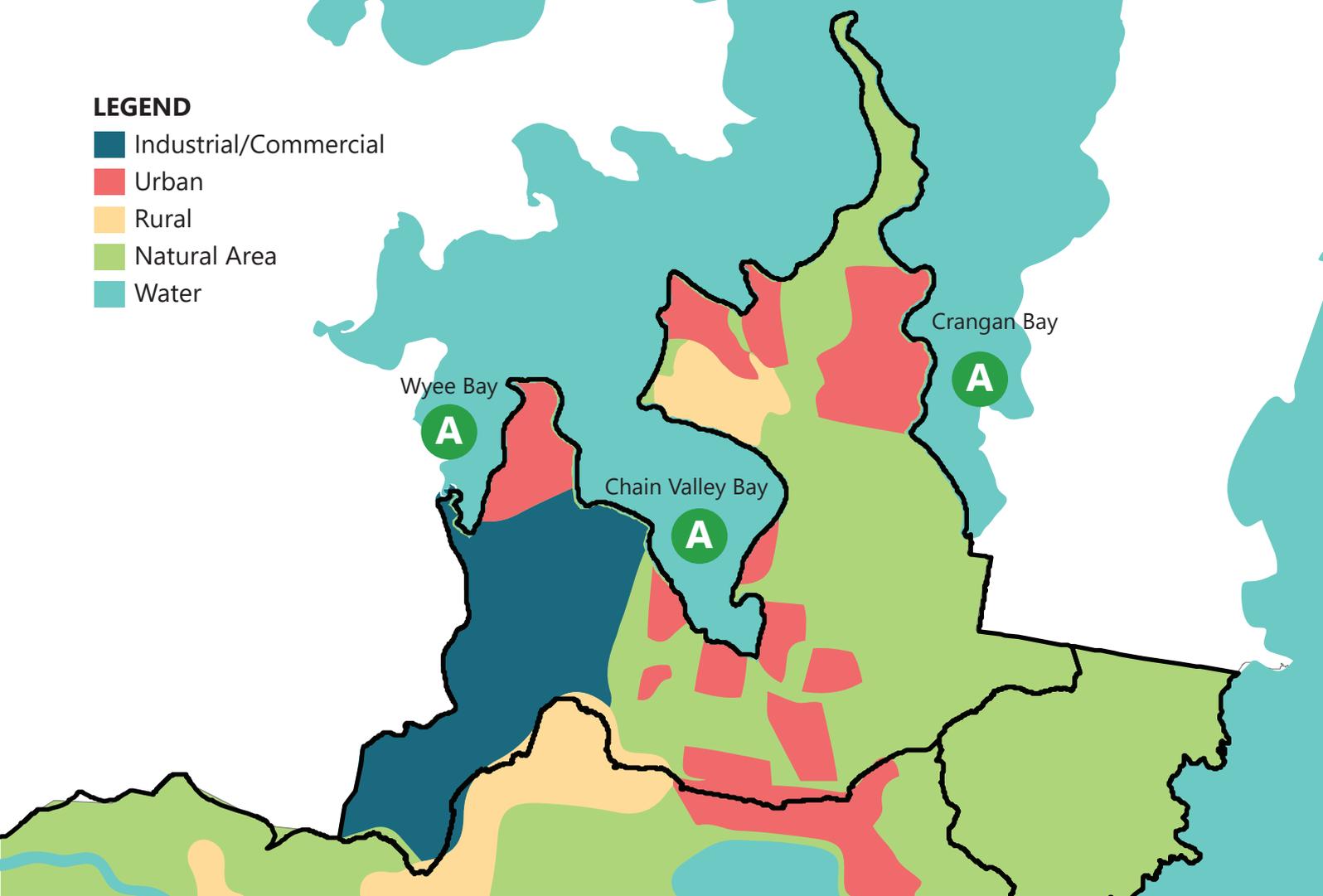
- A Excellent** The indicators meet all benchmarks for more than most of the year. Equal to the best 20% of scores in NSW.
- B Good** The indicators meet all benchmarks for most of the year. Equal to the next 30% of scores in NSW.
- C Fair** The indicators meet some benchmarks for part of the year. Equal 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.
- F Very Poor** The indicators never meet benchmarks. Equal to the worst 5% of scores in NSW.



Southern Lake Macquarie

LEGEND

- Industrial/Commercial
- Urban
- Rural
- Natural Area
- Water



Monitoring in Southern Lake Macquarie commenced in 2017-18.

Water quality in the three southern bays of Lake Macquarie was considered excellent for the 2017-18 monitoring period.

At Chain Valley Bay and Crangan Bay, turbidity and chlorophyll-a levels remaining well below their respective trigger values for the duration of the sampling season.

At Wyee Bay, trigger values for turbidity and chlorophyll-a were rarely exceeded however a marginal spike in turbidity in April 2018 was enough to drop the turbidity grade to a B. Seagrass depth range was excellent at Crangan Bay, and fair at Chain Valley Bay and Wyee Bay.

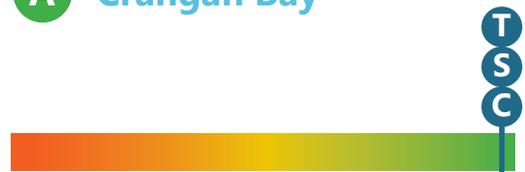
A Wyee Bay



A Chain Valley Bay



A Crangan Bay



Tuggerah Lakes Estuary Management Plan

The Tuggerah Lakes Estuary Management Plan was completed in 2006. Since then, Council has received \$26.25 million in Federal Grants to implement the vision of the plan. Council also invests around \$5 million per year in estuary improvement projects.

Council and our partner organisations have delivered a huge range of priority programs and actions including streambank rehabilitation, wetland and saltmarsh restoration, improved catchment land management, biodiversity improvements, stormwater improvements, recreational upgrades, community education, research and water quality monitoring in line with the vision of the plan.

A map of on-ground estuary management projects is available at centralcoast.nsw.gov.au/tuggerahlakesestuary





Tuggerah Lakes



Monitoring in Tuggerah Lakes commenced in 2011-12. An indication of water quality trend is provided for each site.

Lake Munmorah

Water quality and overall ecological health were good during the 2017-18 sampling period. This is consistent with previous years. Turbidity was excellent, at both sites and chlorophyll-a was good, with only a small number of exceedances throughout the sampling period. Seagrass depth range was considered good. This has remained consistent for the last number of years.

Budgewoi Lake

The water entering Budgewoi Lake from Wallarah Creek exceeded both turbidity and chlorophyll-a trigger values on most occasions throughout 2017-18, sometimes quite substantially. Lower quality water from the estuary catchments has a long-term impact on estuary condition.

Overall water quality at Lake Haven and Budgewoi Lake decreased from good to fair from the previous year. This appears to be driven by increased turbidity at Lake Haven and increase chlorophyll-a at Budgewoi Lake. Seagrass depth range remained good at both sites highlighting the resilience of the system.

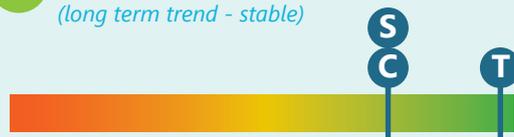
Northern Tuggerah Lake

Overall water quality improved at the northern Tuggerah Lake sites with an overall rating of good/excellent. Despite minor exceedances at Gorokan, overall water quality was considered good with the site improving over the long-term in response to consistent decreases in turbidity.

Occasional minor exceedances for turbidity and chlorophyll-a in the north zone resulted in an overall grade of good which is consistent with the previous year and stable in the long-term. Overall water quality and ecological health at Canton Beach has remained excellent for two years and continues to improve over time despite seagrass depth range decreasing marginally during the sampling period.

Lake Munmorah

B Lake Munmorah shore
(long term trend - stable)



B Lake Munmorah basin
(long term trend - stable)



Budgewoi Lake

C Wallarah Creek



C Lake Haven
(long term trend - stable)



C Budgewoi Lake
(long term trend - stable)



Northern Tuggerah Lake

B Gorokan
(long term trend - improving)



A Canton Beach
(long term trend - improving)



B Tuggerah Lake North
(long term trend - stable)



Central Tuggerah Lake

Water clarity in Wyong River was excellent throughout the monitoring period whilst chlorophyll-a exceeded the trigger value on all occasions and received a poor rating. Elevated chlorophyll can be an indicator of persistent nutrient pollution which triggers microalgal growth. This is likely to have long-term impacts on estuary water quality given catchment inputs are the most significant source of water entering the estuary.

Tuggerah Bay and Tuggerah Lake Centre remained good for the duration of monitoring which is consistent with previous years. The Entrance has remained excellent for the last three sampling occasions, with very few trigger exceedances for either turbidity or chlorophyll-a during this period. Likewise, the overall ecological health of the site continues to remain excellent, despite a decrease in seagrass depth range during the 2017-18 survey.

Southern Tuggerah Lake

Water clarity in Ourimbah Creek was excellent throughout the monitoring period whilst chlorophyll-a received a poor rating. Chlorophyll-a always exceeded the trigger, sometimes quite considerably and may indicate persistent nutrient pollution from the catchment. This was the first year of sampling in Ourimbah Creek and the trend will be further investigated in 2018-19. Nearby Chittaway Bay received an overall grade of excellent with no trigger exceedances during the monitoring period. Significant long-term improvements have been observed at Chittaway Bay with overall water quality going from poor to excellent over the past four years.

Overall water quality improved in the southern zone of Tuggerah Lake whilst seagrass depth range decreased. This is likely a natural fluctuation with overall results for this site remaining stable. The southern foreshore adjacent to Tumbi Creek improved from fair to good in response to increased water clarity. This location received an overall grade of good which represents a stable trend over time.

Central Tuggerah Lake

B Wyong River



B Tuggerah Bay

(long term trend - stable)



B Tuggerah Lake Centre



A The Entrance

(long term trend - stable)



Southern Tuggerah Lake

C Ourimbah Creek



A Chittaway Bay

(long term trend - improving)



B Tuggerah Lake South

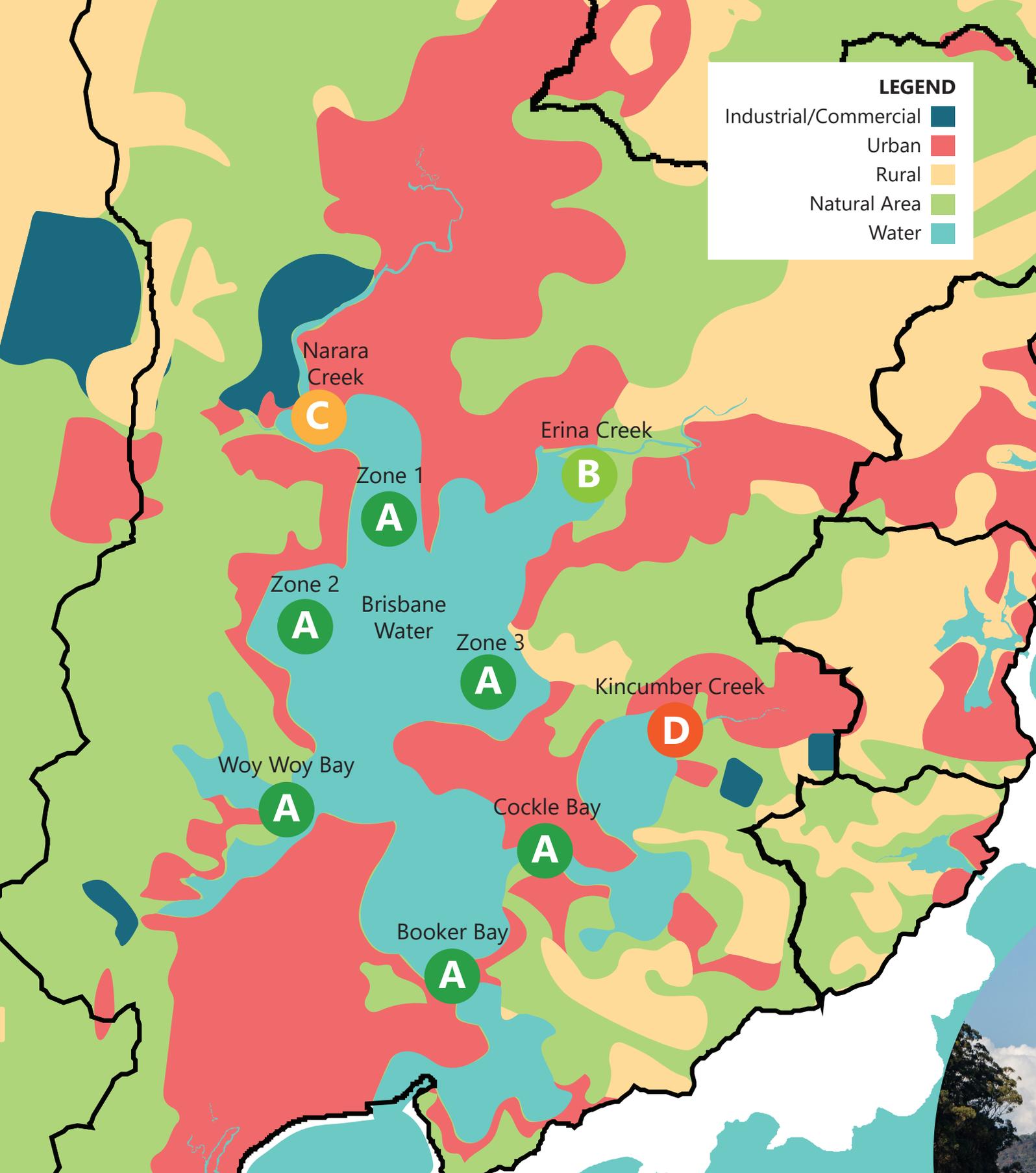
(long term trend - stable)



B Tumbi Creek

(long term trend - stable)





LEGEND

- Industrial/Commercial
- Urban
- Rural
- Natural Area
- Water

Brisbane Water



Water quality throughout Brisbane Water was generally considered excellent, with no trigger exceedances for the main basin sites including Zones 1, 2 and 3, Woy Woy Bay, Cockle Bay or Booker Bay. The well-flushed nature of the main water body ensures water quality remains excellent despite catchment inputs.

Reduced water quality at Narara Creek, Erina Creek and Kincumber Creek highlight some concerns for water quality entering from the catchments. Turbidity and chlorophyll-a exceeded the triggers on a number of occasions throughout the sampling period at Narara Creek with a significant spike associated with low salinity in April 2018. Results at Erina Creek were good with only minor exceedances during the monitoring period.

Kincumber Creek received an overall grade of poor due to regular high turbidity. The shallow nature of this site, coupled with its fine sediment profile, make it susceptible to high turbidity and low water clarity during windy conditions, especially winds from the south. Chlorophyll-a was generally good with some exceedances recorded. These may be linked to nutrients entering the Broadwater from runoff or from nutrients which are already present in the sediment being resuspended by wind and waves. Future monitoring will provide further clarity around water quality patterns in this location.

Baseline seagrass depth range was recorded at multiple locations in Brisbane Water in 2017-18. In future report cards, these results will be used to calculate the annual seagrass grade.



C Narara Creek



B Erina Creek



A Brisbane Water Zone 1



A Brisbane Water Zone 2



A Brisbane Water Zone 3



D Kincumber Creek



A Woy Woy Bay



A Cockle Bay



A Booker Bay



"Catchment management is key:
if you are looking at the estuary
and wondering how to manage
it, then you have your back to the
real problem"



Coastal Lagoons

B Wamberal Lagoon



Water quality within Wamberal Lagoon was considered good for the 2017-18 sampling period, although turbidity within the lagoon frequently exceeded the trigger value. Higher turbidity values were often recorded from Zone 1 (furthest upstream). Chlorophyll-a was excellent within the lagoon for much of the sampling period.

C Terrigal Lagoon



Water quality within Terrigal Lagoon was deemed only fair with both turbidity and chlorophyll exceeding trigger values throughout the entire sampling period. Chlorophyll-a within the lagoon was considered poor, with a number of exceedances, including a large spike in April 2018 that was mostly influenced by values recorded at Zone 1 (furthest upstream). Further investigation is underway in Terrigal Lagoon.

F Avoca Lagoon



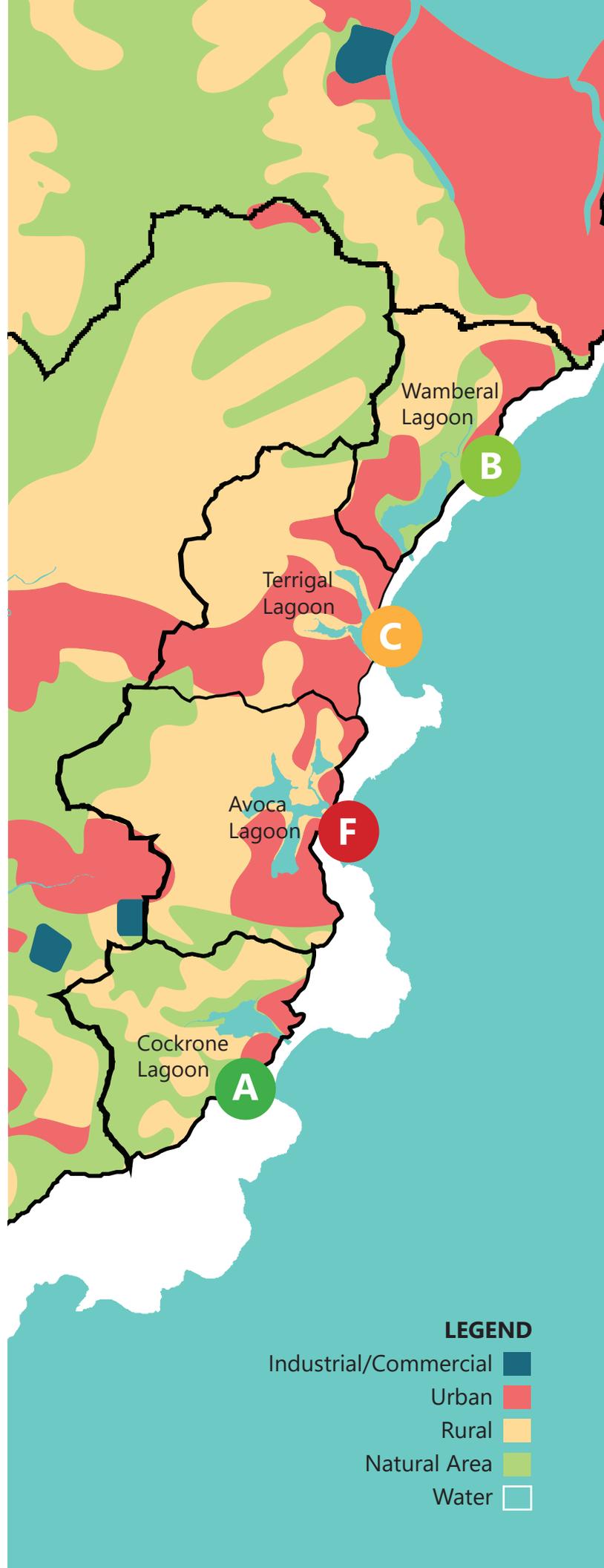
Overall water quality within Avoca Lagoon was considered very poor, with both turbidity and chlorophyll-a clearly exceeding trigger values on all sampling occasions throughout 2017-18. Both sampling zones within the lagoon (upstream and downstream) equally contributed to the high values. A large spike in chlorophyll-a was recorded in January 2018 at both zones within the lagoon. A comprehensive audit is underway in Avoca Lagoon in partnership with the NSW Government to investigate lagoon water quality and catchment pollution sources.

A Cockrone Lagoon



Water quality within Cockrone Lagoon was deemed excellent for the current sampling period. Both turbidity and chlorophyll-a were well below their respective trigger values throughout the entire 2017-18 sampling period.

S Seagrass depth range is not measured in the coastal lagoons



- LEGEND**
- Industrial/Commercial ■
 - Urban ■
 - Rural ■
 - Natural Area ■
 - Water □

Management actions

The health of the Central Coast's waterways is dependent on the health of the broader catchment areas – whatever comes down the rivers or enters the stormwater, ends up in our waterways and can have good or bad impacts. Our personal actions can directly affect the health of our waterways, not only right where we live or work but all the way to the estuaries and ocean. By working together, we can all do our bit to improve and protect our beautiful coastal areas now, and for the future.

Actions Council has taken to help

Council has a strong commitment to the health of our waterways and catchments. In the 2017-18 financial year Council:

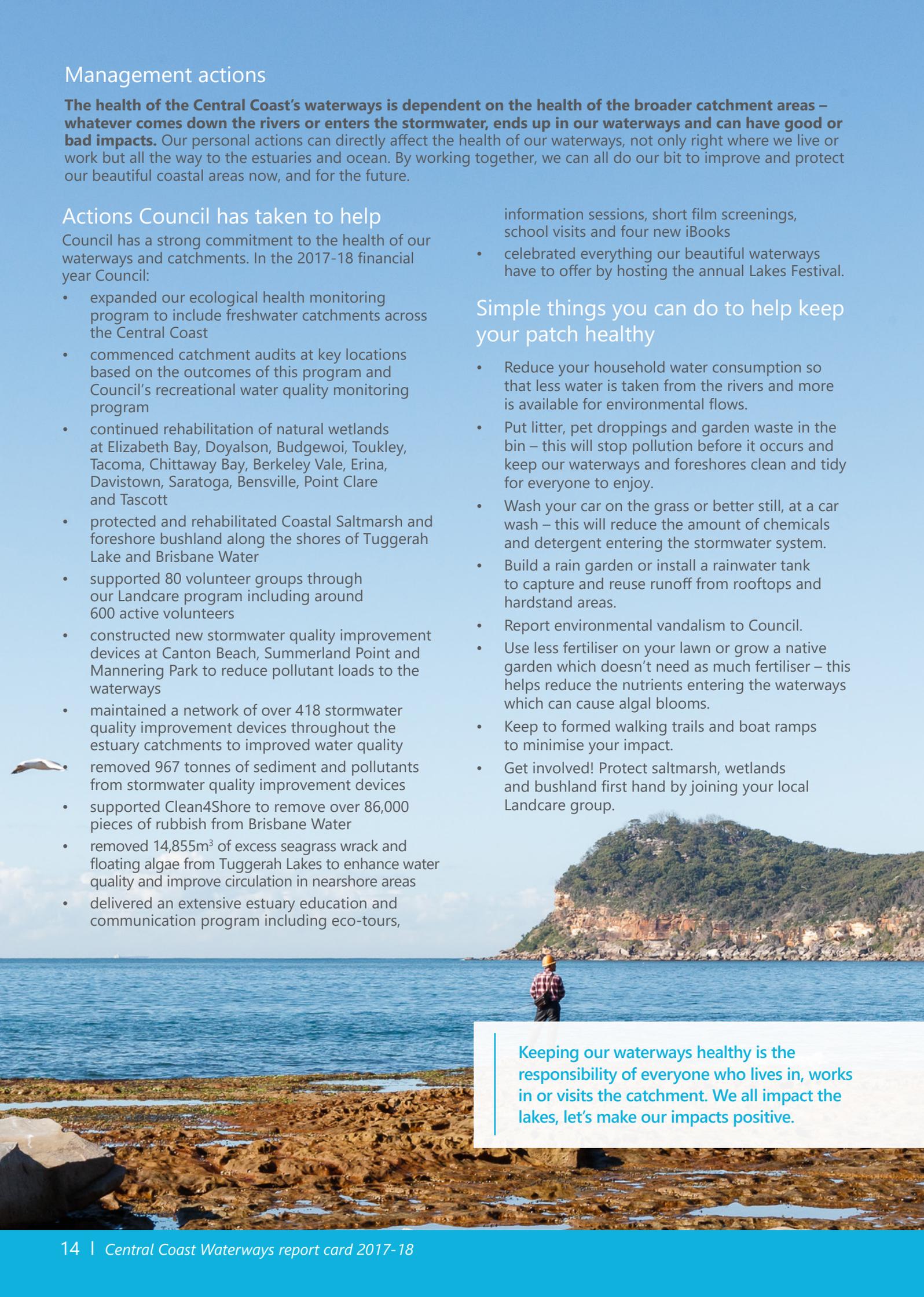
- expanded our ecological health monitoring program to include freshwater catchments across the Central Coast
- commenced catchment audits at key locations based on the outcomes of this program and Council's recreational water quality monitoring program
- continued rehabilitation of natural wetlands at Elizabeth Bay, Doyalson, Budgewoi, Toukley, Tacoma, Chittaway Bay, Berkeley Vale, Erina, Davistown, Saratoga, Bensville, Point Clare and Tascott
- protected and rehabilitated Coastal Saltmarsh and foreshore bushland along the shores of Tuggerah Lake and Brisbane Water
- supported 80 volunteer groups through our Landcare program including around 600 active volunteers
- constructed new stormwater quality improvement devices at Canton Beach, Summerland Point and Mannering Park to reduce pollutant loads to the waterways
- maintained a network of over 418 stormwater quality improvement devices throughout the estuary catchments to improved water quality
- removed 967 tonnes of sediment and pollutants from stormwater quality improvement devices
- supported Clean4Shore to remove over 86,000 pieces of rubbish from Brisbane Water
- removed 14,855m³ of excess seagrass wrack and floating algae from Tuggerah Lakes to enhance water quality and improve circulation in nearshore areas
- delivered an extensive estuary education and communication program including eco-tours,

information sessions, short film screenings, school visits and four new iBooks

- celebrated everything our beautiful waterways have to offer by hosting the annual Lakes Festival.

Simple things you can do to help keep your patch healthy

- Reduce your household water consumption so that less water is taken from the rivers and more is available for environmental flows.
- Put litter, pet droppings and garden waste in the bin – this will stop pollution before it occurs and keep our waterways and foreshores clean and tidy for everyone to enjoy.
- Wash your car on the grass or better still, at a car wash – this will reduce the amount of chemicals and detergent entering the stormwater system.
- Build a rain garden or install a rainwater tank to capture and reuse runoff from rooftops and hardstand areas.
- Report environmental vandalism to Council.
- Use less fertiliser on your lawn or grow a native garden which doesn't need as much fertiliser – this helps reduce the nutrients entering the waterways which can cause algal blooms.
- Keep to formed walking trails and boat ramps to minimise your impact.
- Get involved! Protect saltmarsh, wetlands and bushland first hand by joining your local Landcare group.



Keeping our waterways healthy is the responsibility of everyone who lives in, works in or visits the catchment. We all impact the lakes, let's make our impacts positive.



**PICK UP AFTER
YOUR PET!
IF IT'S ON THE
GROUND,
IT'S IN OUR
WATERWAYS.**

More Information

centralcoast.nsw.gov.au/tuggerahlakesestuary

loveourlivinglakes.com.au

Office of Environment and Heritage (2013) Assessing estuary ecosystem health: sampling, data analysis and reporting protocols

environment.nsw.gov.au/resources/soc/130125esthlthprot.pdf

ANZECC (2000) National Water Quality Management Strategy: The Guidelines

waterquality.gov.au/anz-guidelines/resources/previous-guidelines/anzecc-armcanz-2000



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