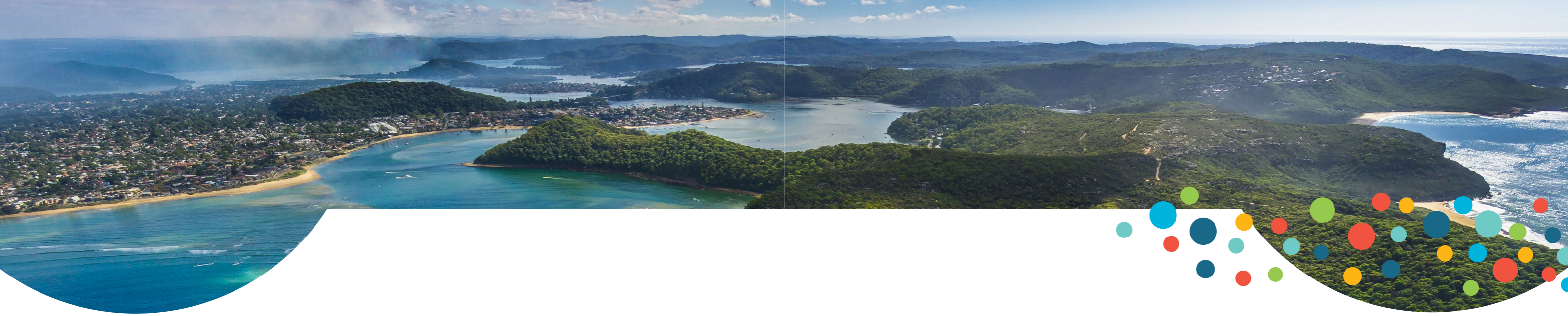


Central Coast  
Waterways  
report card  
2020-21





## Introduction

**This is the fourth 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, the lower Hawkesbury River and our larger coastal lagoons.**

The ecological health data presented here were collected throughout 2020-21.

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.

**Our unique waterways support an incredible diversity of life - the fringing riparian and estuary vegetation provide roosting and breeding habitat for osprey and sea eagles, while spoonbills and stilts wade at the water's edge. Migratory birds travel from Asia and North America to visit, rest and feed. Small-mouth hardyhead, sea mullet and flathead gudgeon graze amongst estuary plants, tolerating the extremes of fresh and salt water. Our waterways are a world of their own, and they are ours to 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 km<sup>2</sup>.

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 our 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 report card 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.

These indicators are 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.

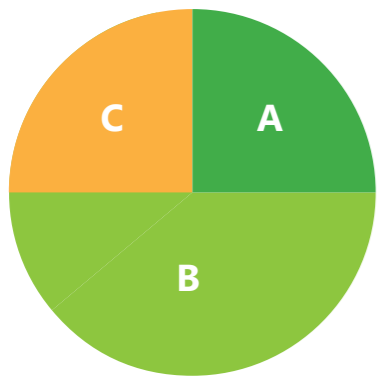
Ecological health does not refer to **environmental health** issues such as drinking water quality, safety for swimming, heavy metal contamination, disease, bacteria, viruses or our ability to harvest shellfish or fish.

## 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 next 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.

# Results at a glance

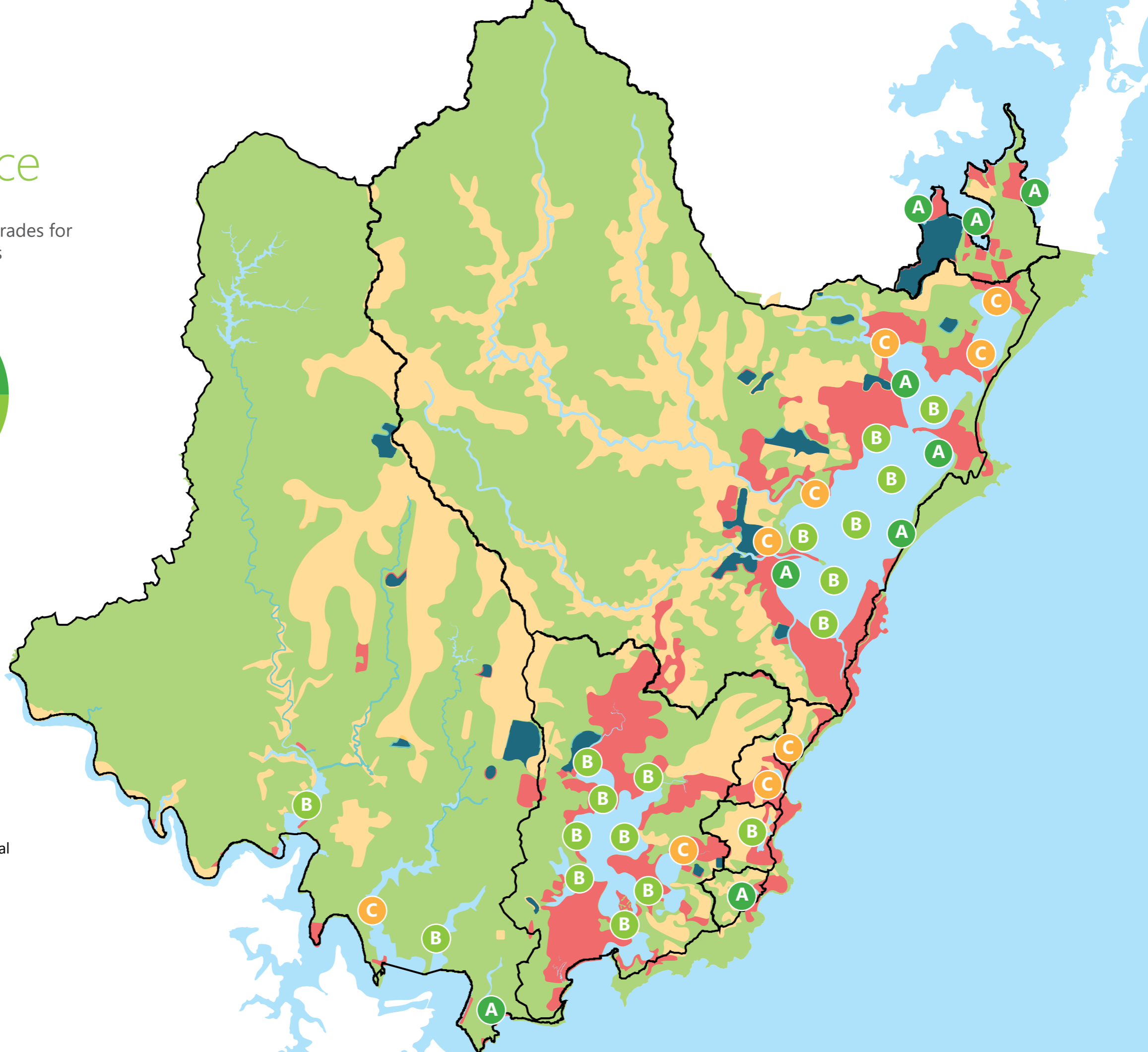
Overall water quality grades for Central Coast estuaries



- A 25%
- B 50%
- C 25%
- D 0%
- F 0%

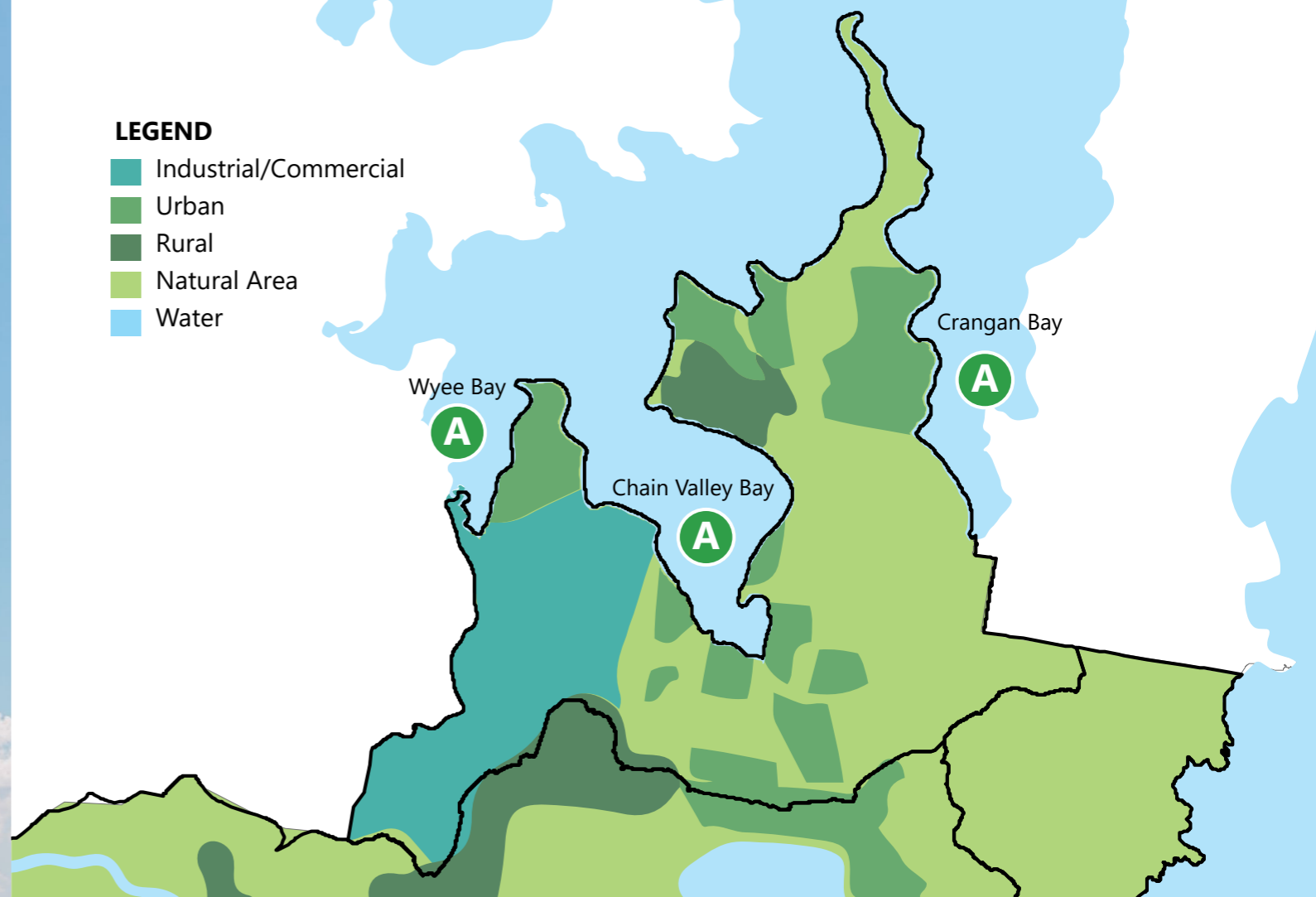
## LEGEND

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



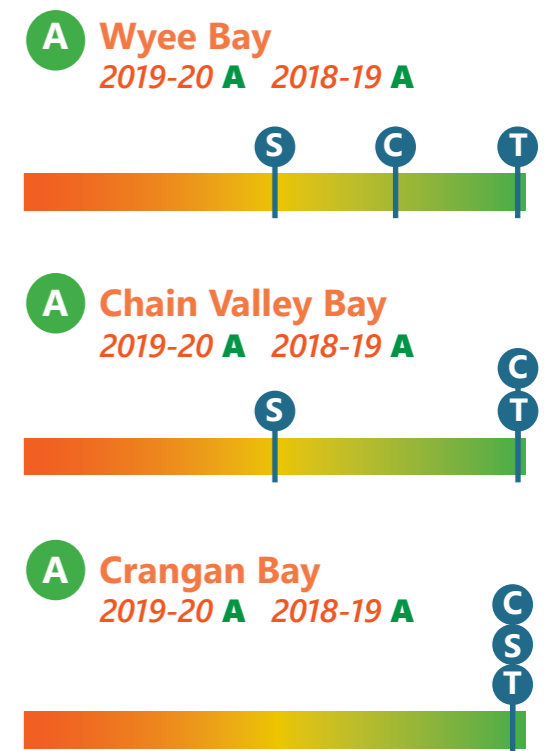


# Southern Lake Macquarie



## Monitoring in Southern Lake Macquarie commenced in 2017-18.

Water quality in the three southern bays of Lake Macquarie remained excellent for the fourth consecutive year. No trigger value exceedances were observed for the duration of sampling with both turbidity and chlorophyll-a levels remaining well below their respective trigger values. Seagrass depth range was again graded excellent at Crangan Bay, and fair at Chain Valley Bay and Wyee Bay.





In 2020 Council was awarded \$5.3 million through the Australian Government's Environment Restoration Fund for local waterway improvement projects across the Central Coast – to view current and past projects, please visit [loveourwaterways.centralcoast.nsw.gov.au/projects](http://loveourwaterways.centralcoast.nsw.gov.au/projects)



## Tuggerah Lakes



## Monitoring in Tuggerah Lakes commenced in 2011-12.

### Lake Munmorah

Water quality and overall ecological health declined from good to fair at both the basin and nearshore sites in Lake Munmorah during the 2020-21 sampling period. This decline was driven by a substantial decline in the chlorophyll-a grade at both sites. Chlorophyll-a values recorded at both sites were almost eight times higher than the trigger value during some sampling occasions. Turbidity improved from good to excellent in the basin and remained excellent at the nearshore site. Seagrass depth range decreased during 2020-21 and was graded in the poor category.

### Budgewoi Lake

The water entering Budgewoi Lake from Wallarah Creek was again graded fair in 2020-21 and exceeded both turbidity and chlorophyll-a trigger values on most occasions throughout the summer/autumn period, sometimes quite substantially. A decline in turbidity from good to fair was counteracted by an improvement in chlorophyll-a from poor to fair. Lower water quality from the estuary catchments has a long-term impact on downstream estuary health.

Overall water quality and ecological health has improved from fair to excellent at Lake Haven in response to lower turbidity throughout the monitoring period with no exceedances of the trigger value at all, which is a first for this site since monitoring began in 2011. Improvements in turbidity and chlorophyll-a were also observed in Budgewoi Lake with the site improving to an overall ecological health grade of good. Seagrass in Budgewoi Lake remained stable in 2020-21. A range of water quality improvement works are underway in the Budgewoi Lake catchment ([yourvoiceourcoast.com/tuggerah-lakes-restoration](http://yourvoiceourcoast.com/tuggerah-lakes-restoration)).

### Northern Tuggerah Lake

Ecological health in the north zone of Tuggerah Lake remained good in 2020-21 due to seagrass depth range and overall water quality both remaining good. Both turbidity and chlorophyll-a remained good, however the trigger value for turbidity was regularly exceeded. Overall water quality and ecological health at Canton Beach has improved from fair in 2019-20 to excellent in 2020-21 with no trigger value exceedances for chlorophyll-a and only one minor exceedance for turbidity during monitoring period. Overall water quality at Gorokan remained good for 2020-21. The chlorophyll-a remained good with only three minor trigger value exceedances, however a decline in the turbidity grade was observed, with the trigger value being exceeded on four occasions.

### Lake Munmorah

**C** Lake Munmorah shore  
2019-20 **B** 2018-19 **B**



**C** Lake Munmorah basin  
2019-20 **B** 2018-19 **B**



### Budgewoi Lake

**C** Wallarah Creek  
2019-20 **C** 2018-19 **C**



**A** Lake Haven  
2019-20 **C** 2018-19 **D**



**B** Budgewoi Lake  
2019-20 **C** 2018-19 **C**



### Northern Tuggerah Lake

**B** Gorokan  
2019-20 **B** 2018-19 **C**



**A** Canton Beach  
2019-20 **C** 2018-19 **B**



**B** Tuggerah Lake North  
2019-20 **B** 2018-19 **C**



### Central Tuggerah Lake

Overall water quality in Wyong River declined from good to fair in 2020-21 due to a decline in the turbidity grade. The chlorophyll-a grade improved from fair to good. Both turbidity and chlorophyll-a often exceeded the trigger value.

The ecological health grade for Tuggerah Bay remained good in 2020-21. Seagrass depth range at this site significantly declined from good to poor, however this was balanced out by an improvement in overall water quality from good to excellent, with no exceedances in either turbidity or chlorophyll-a observed. The overall water quality and ecological health in the Tuggerah Lake Centre zone remained good, whilst improvements in turbidity, chlorophyll-a and seagrass depth range resulted in The Entrance returning from good to excellent ecological health for 2020-21.

### Southern Tuggerah Lake

Overall water quality in Ourimbah Creek remained fair for the fourth consecutive year. Once again, this result was largely a result of persistent high chlorophyll-a levels which showed a slight improvement but were still often above the trigger value indicating persistent nutrient pollution from this catchment.

Chittaway Bay remained at an excellent overall water quality grade with no trigger value exceedances recorded for either turbidity or chlorophyll-a, with results often being well below the trigger values.

Ecological health in the southern zone of Tuggerah Lake remained good in 2020-21 with turbidity, chlorophyll-a and seagrass depth range all remaining at good grades. This continues to be a positive sign for overall ecological health in this part of Tuggerah Lake.

The ecological health of the southern foreshore adjacent to Tumby Creek improved to good in 2020-21 as a result of improvements to the average distance of turbidity and chlorophyll-a from their trigger values. Seagrass depth range remained good within this area of Tuggerah Lake.



### Central Tuggerah Lake

**C** Wyong River  
2019-20 **B** 2018-19 **C**



**B** Tuggerah Bay  
2019-20 **B** 2018-19 **D**



**B** Tuggerah Lake Centre  
2019-20 **B** 2018-19 **C**



**A** The Entrance  
2019-20 **B** 2018-19 **A**



### Southern Tuggerah Lake

**C** Ourimbah Creek  
2019-20 **C** 2018-19 **C**



**A** Chittaway Bay  
2019-20 **A** 2018-19 **B**



**B** Tuggerah Lake South  
2019-20 **B** 2018-19 **B**



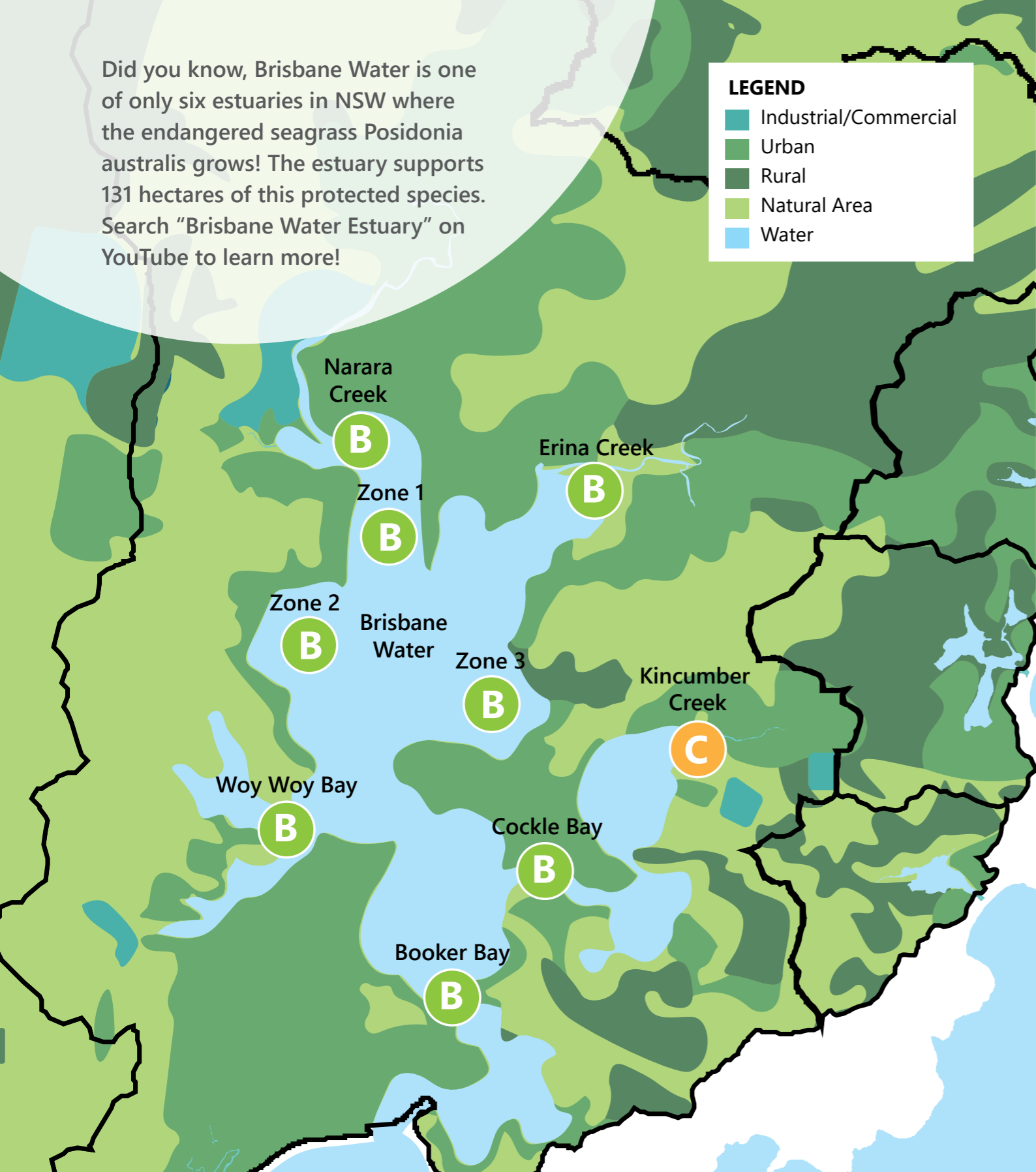
**B** Tumby Creek  
2019-20 **C** 2018-19 **D**



Did you know, Brisbane Water is one of only six estuaries in NSW where the endangered seagrass *Posidonia australis* grows! The estuary supports 131 hectares of this protected species. Search "Brisbane Water Estuary" on YouTube to learn more!

**LEGEND**

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

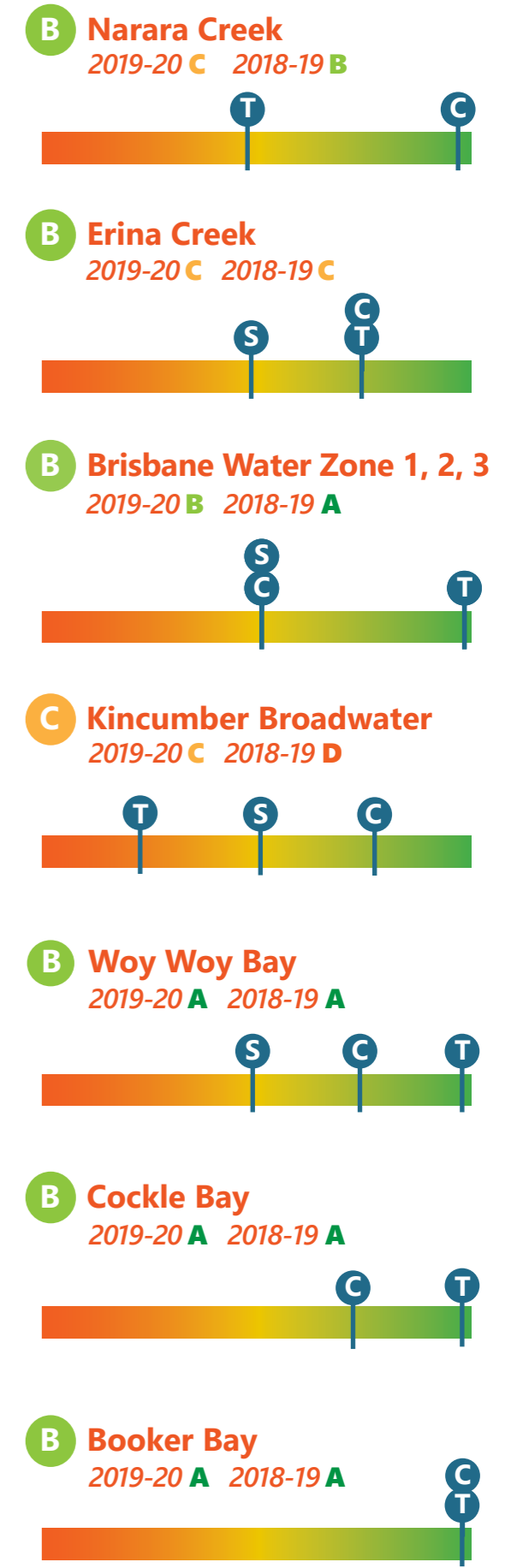


Water quality throughout Brisbane Water in 2020-21 was graded good with the exception of Kincumber Broadwater which received a fair grade. The ecological health grades of the main basin sites including Zones 1, 2 and 3, remained good with no exceedances of the trigger value for turbidity and only one very large exceedance of the chlorophyll-a trigger value which followed rainfall in March which was three times the monthly average. The seagrass depth range decreased to fair in 2020-21.

The heavy rainfall in March 2021 resulted in one significant chlorophyll-a trigger value exceedance at Woy Woy Bay, Cockle Bay and Booker Bay in April, the size of which was enough to cause the ecological health grade at all three sites to drop from excellent to good.

Ecological health and overall water quality of Erina Creek and Narara Creek improved in 2020-21 from fair to good. Improvements in chlorophyll-a were observed at both sites, with Narara Creek recording a significant increase from poor to excellent. Turbidity was generally fair at Narara Creek and good at Erina Creek. The large increase in seagrass depth range observed at Erina Creek in 2019-20 did not continue in 2020-21 with a small decrease in grade being recorded.

Overall water quality and ecological health in Kincumber Broadwater remained fair in 2020-21. The Chlorophyll-a grade remained good, however decreases were recorded in both turbidity and seagrass depth range, with turbidity exceeding the trigger value on all but two occasions.



Brisbane Water



A detailed water quality and catchment audit for Terrigal Beach, Terrigal Haven and the coastal lagoons began in 2019. For more information visit [yourvoiceourcoast.com/tcla](http://yourvoiceourcoast.com/tcla)

# Coastal Lagoons

## C Wamberal Lagoon 2019-20 C 2018-19 C



Overall water quality within Wamberal Lagoon remained fair for the 2020-21 sampling period, with turbidity exceeding the trigger value on all sampling occasions. Turbidity values were again often higher in Zone 1 (furthest upstream site) than in Zone 2. Chlorophyll-a concentrations were generally within guidelines throughout the lagoon, with only two relatively minor exceedances of the trigger value occurring during the sampling period.

## C Terrigal Lagoon 2019-20 C 2018-19 C



Overall water quality within Terrigal Lagoon remained fair during the 2020-21 sampling period, despite a slight improvement in the turbidity grade. Turbidity values exceeded the trigger values for all but two sampling occasions throughout the sampling period whilst chlorophyll-a was good despite the trigger being slightly exceeded on all six sampling occasions. A detailed water quality and catchment audit of Terrigal Beach, Terrigal Haven and Terrigal Lagoon commenced in 2019 – [yourvoiceourcoast.com/tcla](http://yourvoiceourcoast.com/tcla).

## B Avoca Lagoon 2019-20 F 2018-19 F

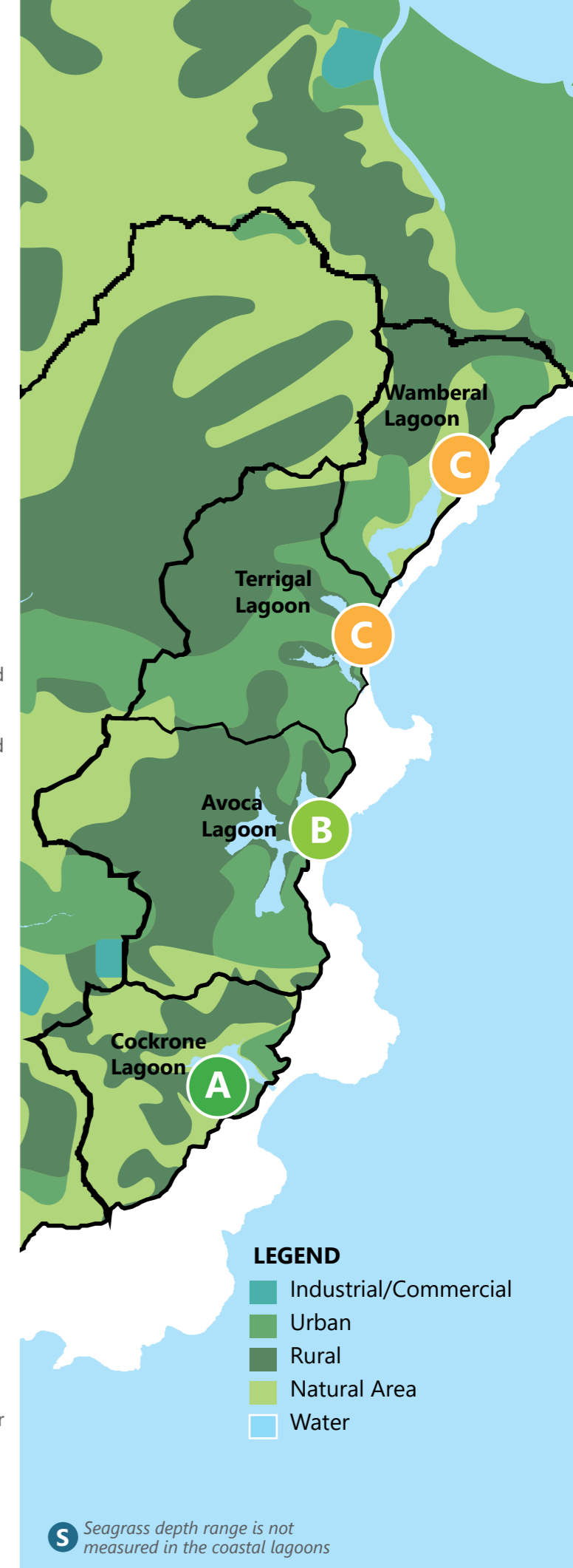


The 2020-21 sampling period saw a vast improvement in water quality in Avoca Lagoon with the overall water quality grade increasing from very poor to good, as a result of both turbidity and chlorophyll-a improving by two grades. Despite a significant improvement in the turbidity grade, the trigger value was exceeded on all occasions, with turbidity in the upstream site higher than the downstream site. Chlorophyll-a exceeded the trigger value on four of the six sampling occasions, however these were only relatively minor exceedances. Council is working with the NSW Government to better understand water quality dynamics and management strategies for Avoca Lagoon through Stage 2 of the Coastal Management Program – [yourvoiceourcoast.com/waterways](http://yourvoiceourcoast.com/waterways).

## A Cockrone Lagoon 2019-20 A 2018-19 B



Overall water quality within Cockrone Lagoon was excellent for the 2020-21 sampling period. No trigger value exceedances were observed for chlorophyll-a, with this variable being often well below the trigger value. Turbidity dropped from excellent to good as a result of two relatively minor trigger value exceedances.







# Lower Hawkesbury River



## LEGEND

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

### **A** Patonga Creek 2019-20 **A** 2018-19 **A**



Overall water quality within Patonga Creek continued to be excellent in 2020-21. Two trigger value exceedances for turbidity were observed during the sampling period, one of which was more than double the trigger value and resulted in the turbidity grade dropping from excellent to good.

### **B** Mullet Creek 2019-20 **B** 2018-19 **B**



Overall water quality in Mullet Creek remained good despite the trigger value for turbidity being exceeded on all but one sampling occasions. As seen previously, most exceedances for turbidity were recorded in Zone 2 (lower site), with turbidity recorded in Zone 1 (upper site) generally below the trigger values. An improvement from fair to good, was observed during the 2020-21 sampling period for chlorophyll-a.

### **C** Mooney Mooney Creek 2019-20 **C** 2018-19 **C**



Overall water quality within Mooney Mooney Creek continued to be fair in 2020-21. At both upstream and downstream sites, turbidity and chlorophyll-a exceeded the trigger values on almost all sampling occasions. The extent to which the trigger values were exceeded slightly which resulted in a small improvement in the grading for chlorophyll-a. This improvement was however counteracted by a decrease in grading for turbidity.

### **B** Mangrove Creek 2019-20 **B** 2018-19 **C**



Overall water quality in Mangrove Creek remained good in 2020-21. The trigger value for turbidity was exceeded on five out of six sampling occasions, however these were only relatively minor exceedances. An improvement in the chlorophyll-a grade was observed, with no exceedances of the trigger value during the 2020-21 sampling period.

## 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 local waterways and catchments. In the past 12 months Council has:

- Commenced the development of Coastal Management Programs for all coastal waterways on the Central Coast in partnership with our neighbouring Councils and the NSW Government – [yourvoiceourcoast.com/waterways](http://yourvoiceourcoast.com/waterways)
- Continued the Terrigal and Coastal Lagoon Audit – a comprehensive water quality monitoring and improvement program including significant on-ground works to resolve water quality issues – [yourvoiceourcoast/tcla](http://yourvoiceourcoast/tcla)
- Continued rehabilitation of natural wetlands at Elizabeth Bay, Doyalson, Budgewoi, Toukley, Tacoma, Chittaway Bay, Berkeley Vale, Erina, Davistown, Saratoga, Bensville, Avoca and Terrigal and restoration of coastal saltmarshes along the shores of Tuggerah Lake and Brisbane Water.
- Constructed new stormwater quality improvement devices at Gwandalan and Wamberal to reduce pollutant loads to the waterways.
- Maintained a network of over 420 stormwater quality improvement devices throughout the estuary catchments to improved water quality.
- Intercepted and removed over 700 tonnes of sediment and pollution from stormwater quality improvement devices before it reached the waterways.
- Managed 22 priority creek areas as part of the Flood Mitigation Creek Maintenance Program, 280 tonnes of sediment, rubbish and priority weeds were removed along with management of vegetation to allow the water to flow.
- Removed around 7,500m<sup>3</sup> of excess seagrass wrack and floating algae from Tuggerah Lakes. In addition to this, a total of 500 tonnes of material was collected from the foreshores following the March 2021 flood.
- Continued to update projects on the Love Our Waterways website, which covers all things Tuggerah Lakes.

## Simple things you can do to help keep your patch healthy

- Tread lightly around our waterways – by keeping to formed walking trails and boat ramps or light watercraft launch facilities you can minimise your impact while connecting with our natural environments.
- Respect our catchments - whether you are near the waterways or up in the bush, your actions have an impact. Take a bag with you to bring out any rubbish you create and safely pick up any rubbish you find on your adventure. Our local environments will thank you for it!
- Keep your garden as the envy of the neighbourhood - make sure your garden plants don't escape into surrounding bushland by disposing of your garden waste into your green bin.
- Check your pipes - Do you suspect there's something dodgy going on with your stormwater or sewer connection? Sometimes things get mixed up and our pipes get connected incorrectly – if you think something is awry at your place, call a licenced plumber to take a look. Reducing these incorrect connections is a major win for the health of our waterways as it reduces the sewage overflows in times of heavy rain.
- Arm yourself with knowledge on our waterways and catchments so you can help to spread the good news – we have a [YouTube playlist](#) dedicated to our waterways. Search 'Love our waterways Central Coast Council'.
- Get involved! Protect saltmarsh, wetlands and bushland first hand by joining your local Environmental Volunteer group.

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

Did you know – picking up your dog's poo is important for not only keeping our shoes clean while we enjoy our beautiful natural environments? It also helps to keep excess nutrients and harmful bacteria and microorganisms out of our waterways, which makes the water healthier for our aquatic creatures and human swimmers.



# PUT GRASS CLIPPINGS IN THE GREEN BIN!

# IF IT'S ON THE GROUND, IT'S IN OUR WATERWAYS.

Central Coast Council has published 6 interactive Multi-Touch Books about our waterways. Two about wetlands, one about Brisbane Water and three about Tuggerah Lakes. The wetlands books contain interactive activities, games, videos and animal sounds and are linked to the Australian curriculum for primary and infant students. The Brisbane Water book covers major habitats and tips on how we can all help and the Tuggerah Lakes books look at habitats, impacts, case studies and recreational activities including fishing, birdwatching, walking and bike riding. The Explore book partners with the Tuggerah Lakes Estuary Explore app that you can download to discover more fishing, birdwatching and walking/riding areas around the lakes. Download the iBooks for FREE or view them at [loveourwaterways.centralcoast.nsw.gov.au/learn/educational-resources/download-our-interactive-ibooks](http://loveourwaterways.centralcoast.nsw.gov.au/learn/educational-resources/download-our-interactive-ibooks)

(October 2021)

## More Information

[centralcoast.nsw.gov.au/tuggerahlakesestuary](http://centralcoast.nsw.gov.au/tuggerahlakesestuary)

[centralcoast.nsw.gov.au/waterwayhealth](http://centralcoast.nsw.gov.au/waterwayhealth)

[loveourwaterways.centralcoast.nsw.gov.au](http://loveourwaterways.centralcoast.nsw.gov.au)

[environment.nsw.gov.au/resources/soc/130125esthlthprot.pdf](http://environment.nsw.gov.au/resources/soc/130125esthlthprot.pdf)

[waterquality.gov.au/anz-guidelines/resources/previous-guidelines/anzecc-armcanz-2000](http://waterquality.gov.au/anz-guidelines/resources/previous-guidelines/anzecc-armcanz-2000)

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*Photography – Andy Smith, David Ross and Central Coast Council*



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