

Central Coast
Waterways
report card
2021-22





Introduction

This is the fifth 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 2021-22.

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 start as small freshwater streams in the upper catchments of our beautiful Central Coast hinterland. As they weave their way through our landscapes they grow wider and deeper, transforming into estuaries where the freshwater of the catchments blends with the salty marine water from the Pacific Ocean. The plant life living in and around our waterways is critical to the health of these ecosystems and provides habitat for an immense variety of native wildlife. Our waterways are a treasure for those lucky enough to live on or visit the Central Coast and we are committed to protecting and restoring them.

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 1845 km².

The Central Coast's waterways form part of the NSW coastal zone and 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, cultural and economic 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.

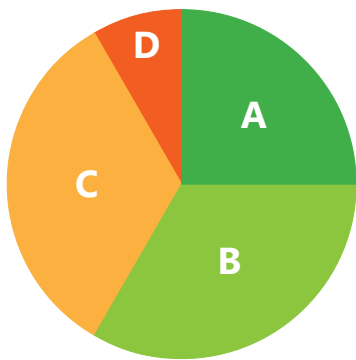
Ecological health does not refer to **environmental health** issues such as drinking water quality, safety for swimming, heavy metal contamination, disease, bacteria, viruses or our ability to harvest shellfish or fish.

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 middle 30% of scores in NSW.
- D** **Poor** The indicators met 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

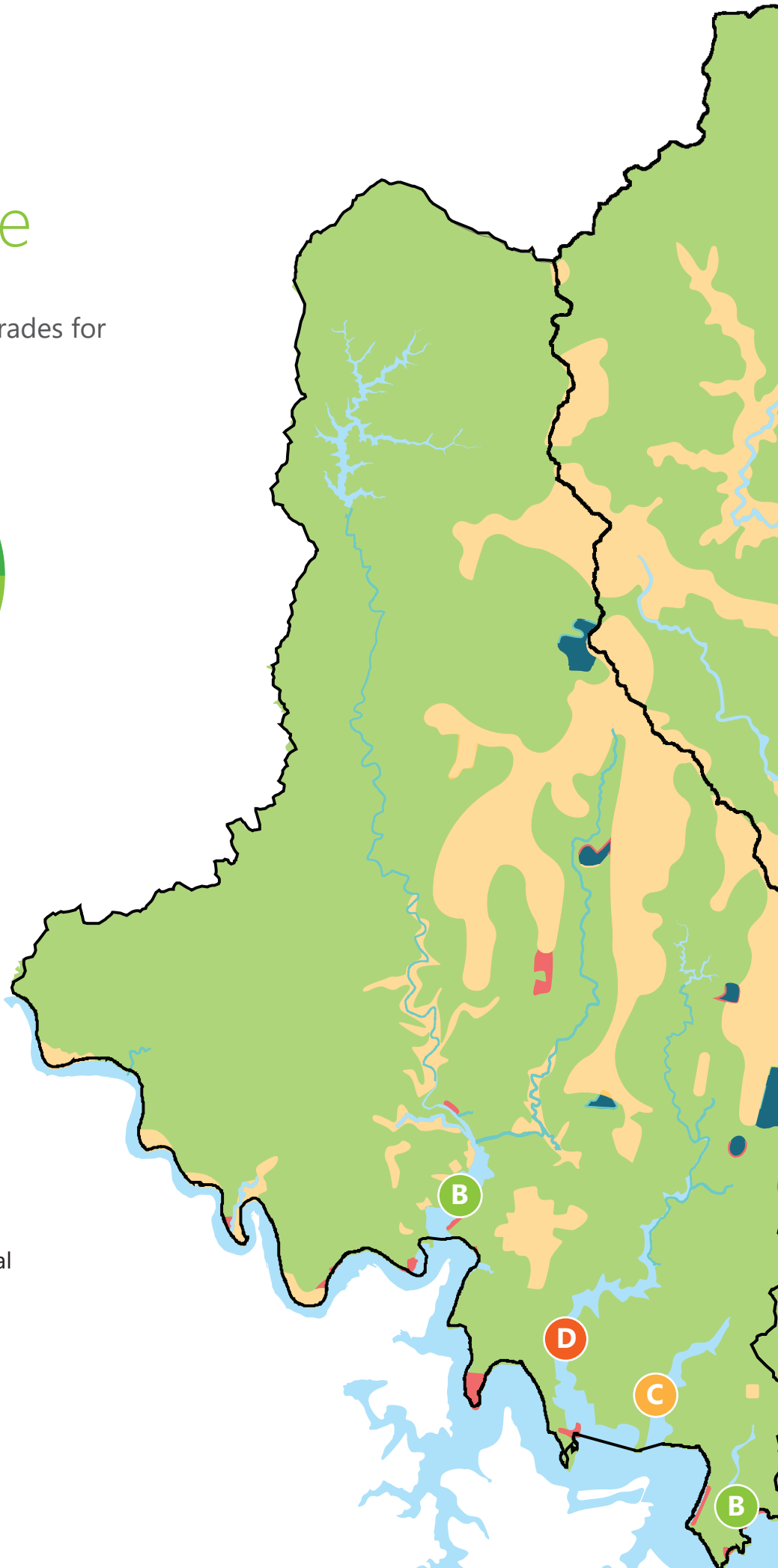
Overall water quality grades for Central Coast estuaries

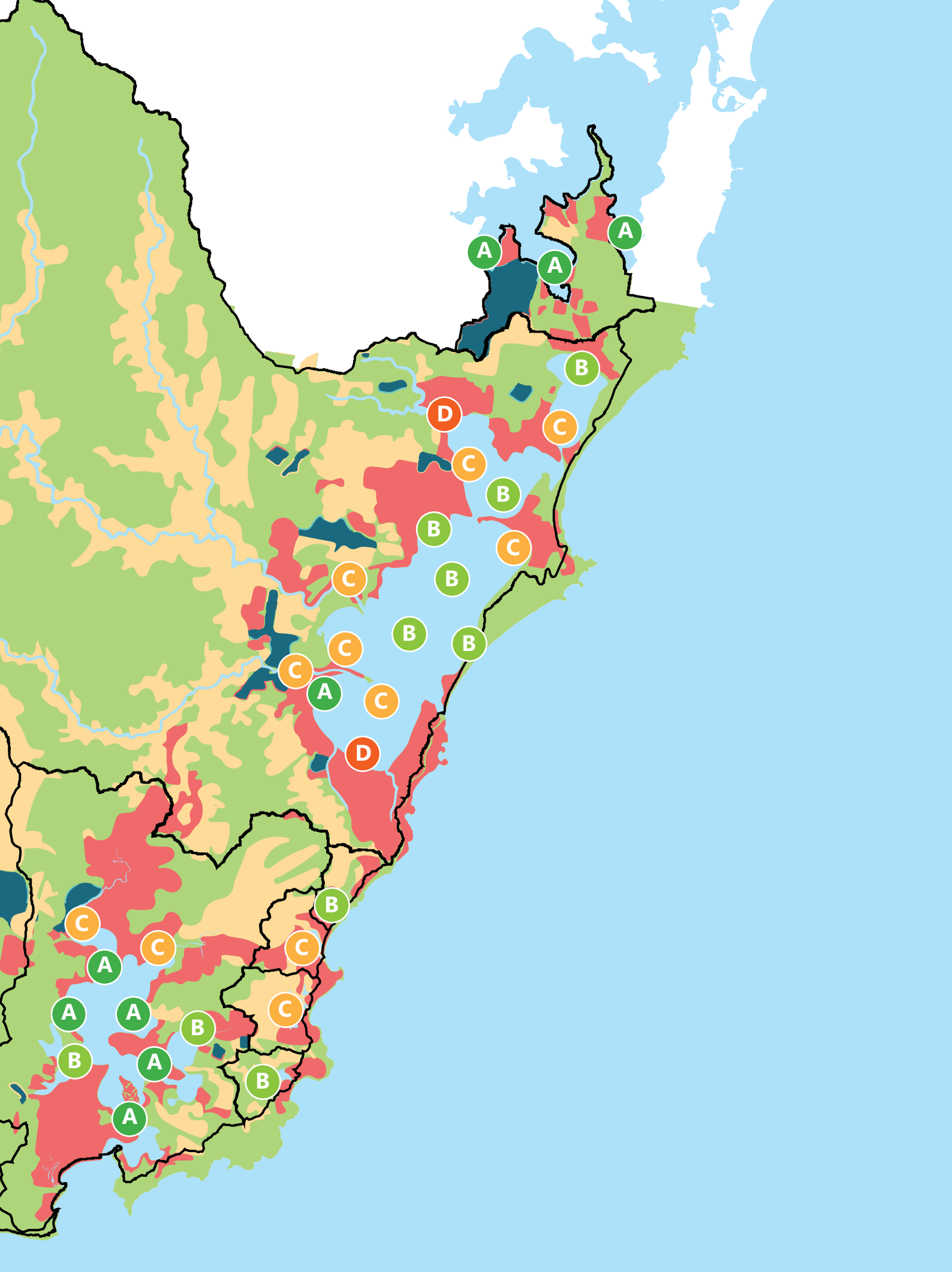


- A** 25%
- B** 33.3%
- C** 33.3%
- D** 8.3%
- F** 0%

LEGEND

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



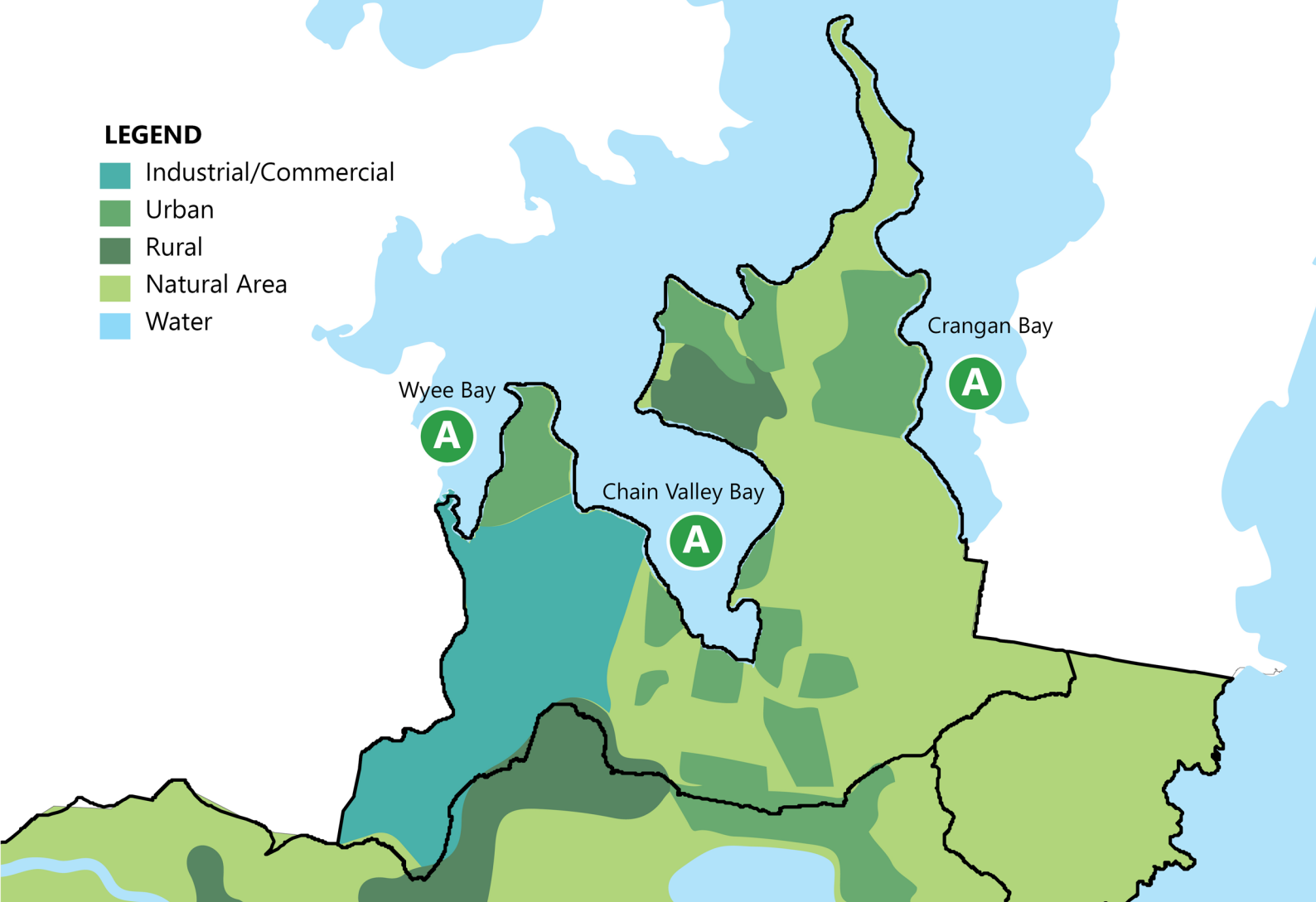




Southern Lake Macquarie

LEGEND

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



Monitoring in Southern Lake Macquarie commenced in 2017-18.

For the fifth consecutive year, overall water quality and ecological health in the three southern bays of Lake Macquarie remained excellent. Turbidity levels generally remained well below the trigger value with no exceedances recorded for any site during the sampling period. Chlorophyll-a levels remained below their respective trigger value at all sites with only one trigger value exceedance at Chain Valley Bay. Seagrass depth range was again graded excellent at Crangan Bay and fair at Chain Valley Bay and Wyee Bay.

A Wyee Bay
2019-20 **A** 2020-21 **A** 2021-22 **A**




A Chain Valley Bay
2019-20 **A** 2020-21 **A** 2021-22 **A**



A Crangan Bay
2019-20 **A** 2020-21 **A** 2021-22 **A**





Did you know
that we are currently developing
a Coastal Management Program
for Tuggerah Lakes? It will contain
management actions to guide our
work around the estuary and will
replace the Tuggerah Lakes Estuary
Management Plan (2006).
For more information visit
yourvoiceourcoast.com/waterways



Tuggerah Lakes



Monitoring in Tuggerah Lakes commenced in 2011-12.

Lake Munmorah

Ecological health improved from fair to good at the nearshore site in Lake Munmorah and remained fair in the basin site during the 2021-22 sampling period. Both sites recorded improvements to their overall water quality as a result of substantial improvements to the chlorophyll-a grade at both sites. Turbidity remained excellent in the basin with no exceedances while one minor exceedance at the nearshore site resulted in a drop from excellent to good. Unlike other parts of Tuggerah Lakes, Lake Munmorah was significantly less affected by catchment flooding in March 2022. Seagrass depth range remained poor during 2021-22.

Budgewoi Lake

The water entering Budgewoi Lake from Wallarah Creek declined from fair to poor during 2021-22. Turbidity and chlorophyll-a trigger values were exceeded on all but one occasion throughout the summer/autumn period. Following an East Coast Low and subsequent flooding in March 2022, turbidity was six times higher than the trigger value. This was followed by a similar spike in chlorophyll-a during April 2022. The Wallarah Creek catchment delivers large volumes on inflow to the estuary, particularly during wet years. Whilst floods are a natural occurrence, they can deliver a pulse of sediment and nutrients to the estuary which can negatively affect long-term estuary health when they occur on top of already elevated background levels.

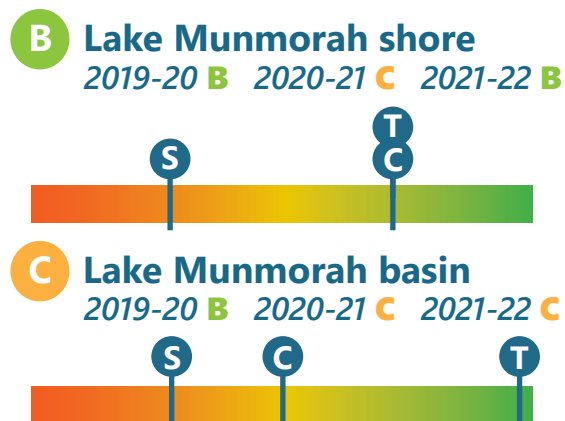
Overall water quality and ecological health remained good in the basin, however the nearshore site at Lake Haven declined from excellent to fair in 2021-22. The decline recorded at Lake Haven was a result of both turbidity and chlorophyll-a. Turbidity exceeded the trigger value once in March 2022 by seven times. Chlorophyll-a exceeded the trigger value on four occasions showing the system response to excess nutrient inflow. Despite the decrease in water quality entering from the catchment, seagrass in Budgewoi Lake remained stable during 2021-22.

A range of water quality improvement works are underway in the Budgewoi Lake catchment (yourvoiceourcoast.com/tuggerah-lakes-restoration).

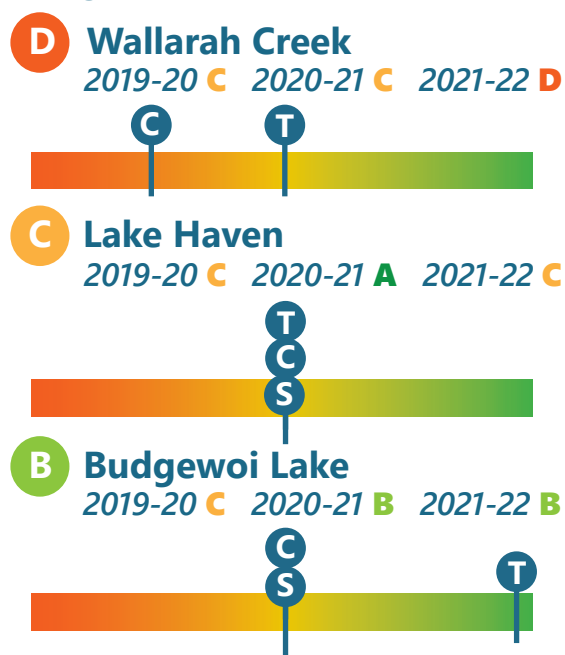
Northern Tuggerah Lake

During 2021-22 overall water quality and ecological health remained good in the lake basin and at the Gorokan nearshore site. Canton Beach declined from excellent to fair, in response to regular minor exceedances of the trigger value and one large exceedance of the chlorophyll-a value in April 2022. This reading exceeded the trigger value by three and a half times showing the algal response to pulse inputs of nutrient and sediment during floods. Seagrass depth range for the northern zone of Tuggerah Lake remained good in 2021-22.

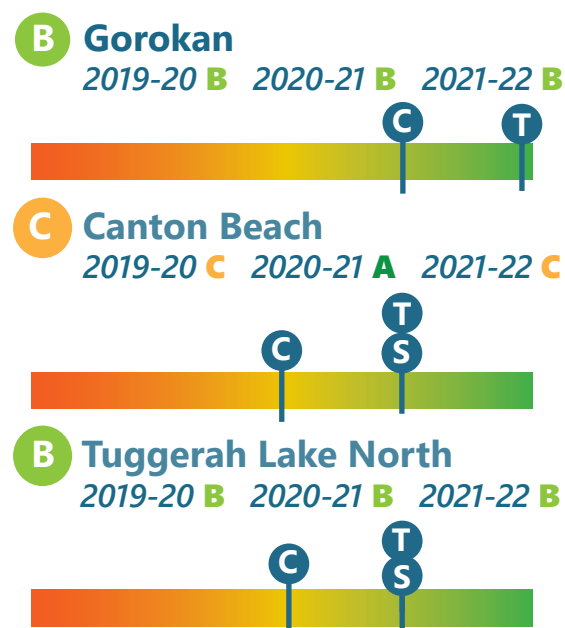
Lake Munmorah



Budgewoi Lake



Northern Tuggerah Lake



Central Tuggerah Lake

Overall water quality flowing into Central Tuggerah Lake from Wyong River remained stable at a grading of fair. Three exceedances of both the turbidity and chlorophyll-a trigger values were recorded in Wyong River during 2021-22.

Whilst the overall water quality and ecological health of the Central Tuggerah Lake basin remained stable at good, declines in overall water quality and ecological health were recorded at both nearshore sites. Tuggerah Bay declined to fair and The Entrance declined to good. Across all sites during 2021-22, turbidity exceedances were relatively minor, with none recorded at The Entrance. When chlorophyll-a exceeded the trigger value, it was often by a substantial margin of up to three and a half times the trigger value. Again, this was in response to wetter than average conditions across all locations. Seagrass depth range improved for the basin zone, however declined at both nearshore sites.

A range of water quality improvement works are underway in the Central Tuggerah Lake catchment (yourvoiceourcoast.com/tuggerah-lakes-restoration).

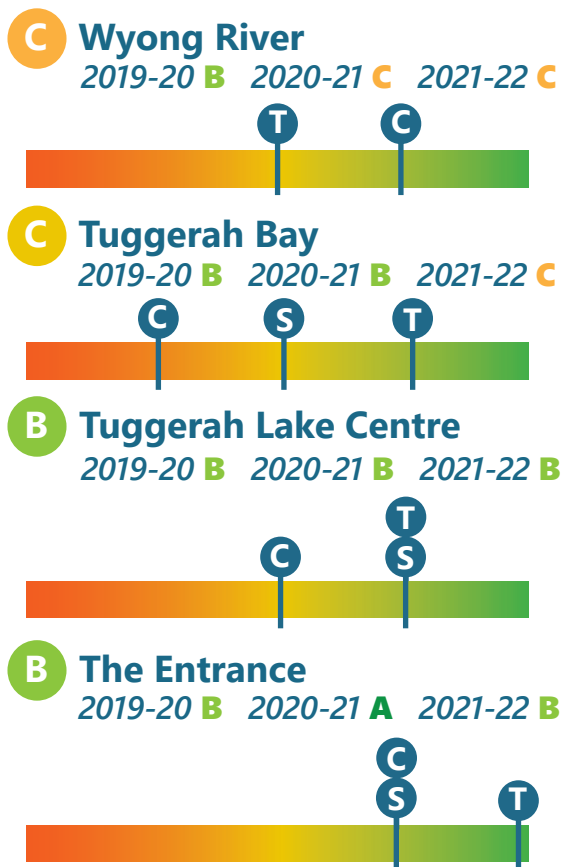
Southern Tuggerah Lake

Overall water quality in Ourimbah Creek remained fair for the fifth consecutive year. Chlorophyll-a levels remained high, exceeding the trigger values on all but one occasion, and turbidity exceeded its trigger value on three occasions with the sample taken following the March 2022 flood being nine times higher than the trigger value.

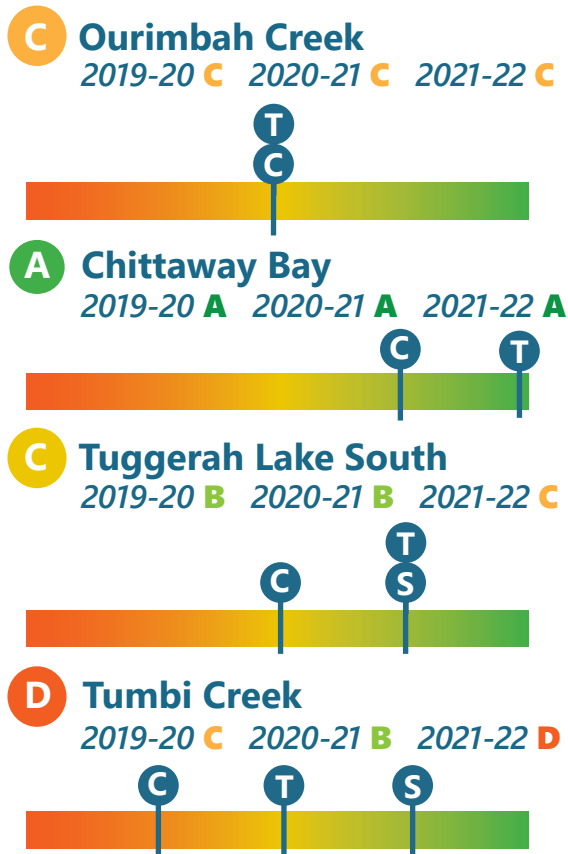
Declines in overall water quality and ecological health were recorded at two sites, with the southern basin zone of Tuggerah Lake graded fair and the nearshore zone adjacent to Tumbi Creek graded poor in 2021-22. This was as a result of the chlorophyll-a exceeding its trigger value on multiple occasions with many exceedances being quite significant. Despite these declines, seagrass depth range remained good within this area of Tuggerah Lake and Chittaway Bay also remained at an excellent overall water quality grade with no trigger value exceedances recorded for turbidity and only one exceedance for chlorophyll-a.



Central Tuggerah Lake



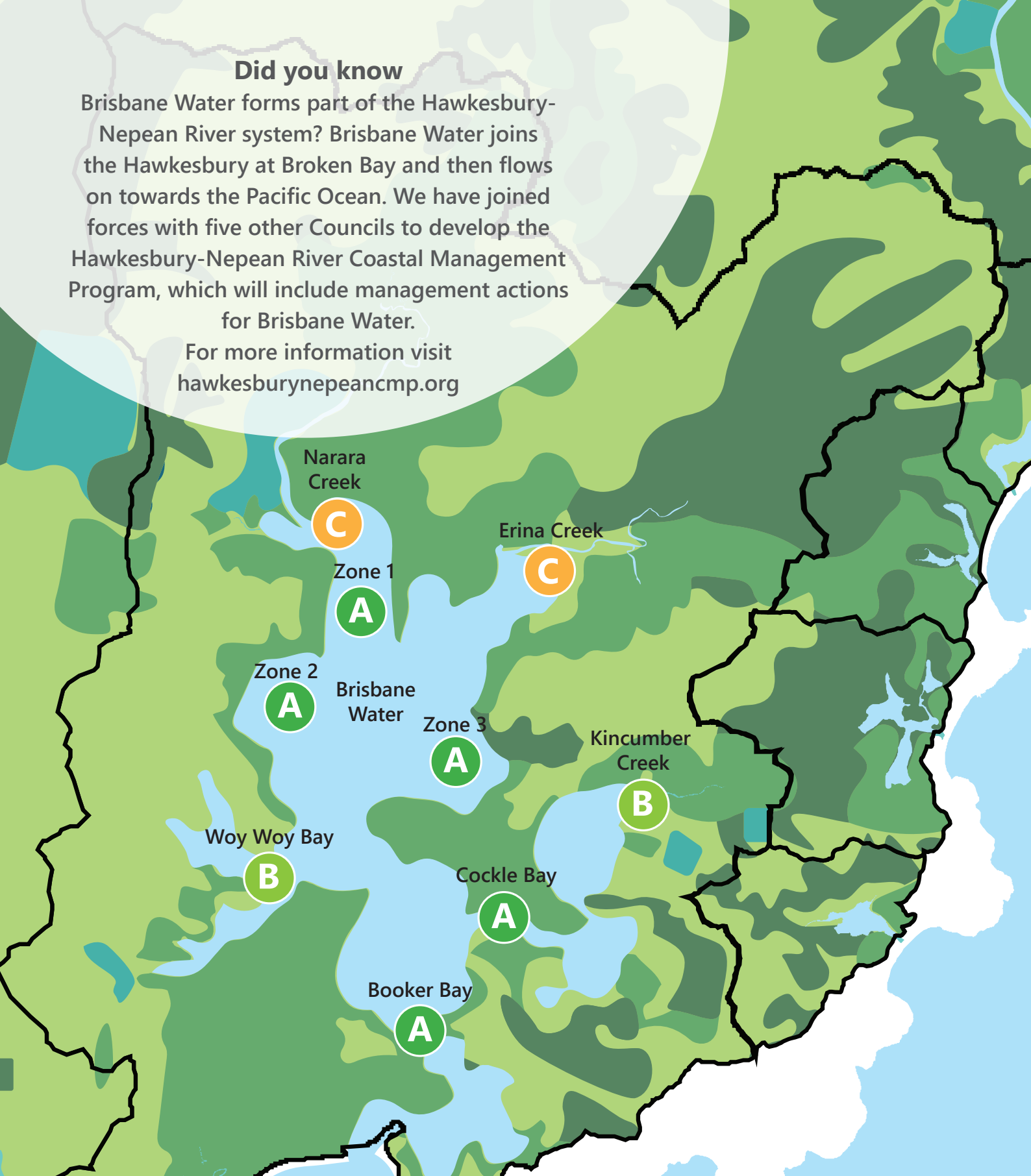
Southern Tuggerah Lake



Did you know

Brisbane Water forms part of the Hawkesbury-Nepean River system? Brisbane Water joins the Hawkesbury at Broken Bay and then flows on towards the Pacific Ocean. We have joined forces with five other Councils to develop the Hawkesbury-Nepean River Coastal Management Program, which will include management actions for Brisbane Water.

For more information visit hawkesburynepeancmp.org



Brisbane Water

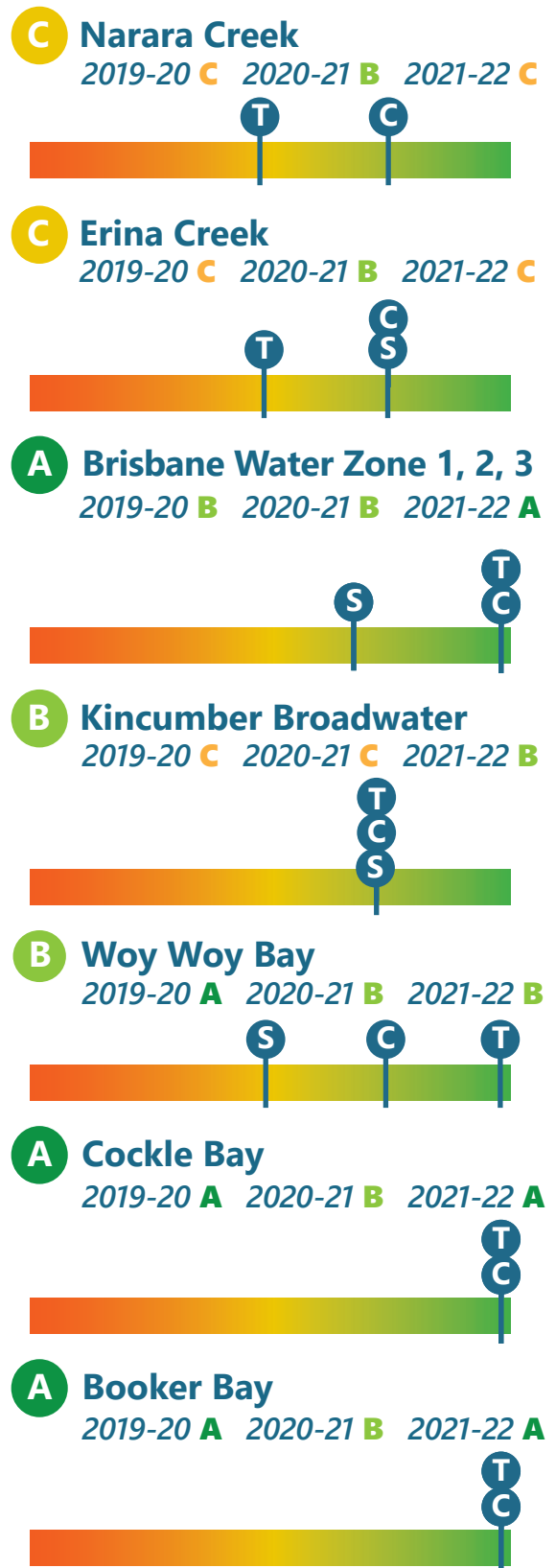
Monitoring in Brisbane Water commenced in 2017-18.

Water quality throughout Brisbane Water in 2021-22 was graded between excellent and fair. The ecological health grades of the three main basin sites, returned from good to excellent with no exceedances of either the turbidity or chlorophyll-a trigger values despite wetter than average conditions. The seagrass depth range improved from fair to good in 2021-22.

Overall water quality decreased from good to fair in both Erina and Narara Creeks in 2021-22. These decreases were driven mostly by exceedances of the turbidity trigger value, including significant exceedances (three and a half times and five times respectively) in April 2022 which was more than double the monthly average. Despite this, an improvement in seagrass depth range was recorded at Erina Creek.

Overall water quality and ecological health in Woy Woy Bay remained good in 2021-22. Turbidity, chlorophyll-a and seagrass depth range all remained stable, despite one substantial exceedance of the chlorophyll-a trigger value in April 2022.

During 2021-22 three sites recorded improved overall water quality, with Cockle Bay and Booker Bay returning from good to excellent whilst Kincumber Creek improved from fair to good. Cockle Bay and Booker Bay both recorded no exceedances of either turbidity or chlorophyll-a trigger values during the sampling period. Kincumber Creek recorded a major improvement in turbidity from poor to good, which drove the improvement to the overall grade. Seagrass depth range at this site also improved from fair to good due to a slight increase in average measured depth range.





Did you know
that recommendations from the
detailed water quality and catchment
audit for Terrigal Beach, Terrigal Haven
and the coastal lagoons are now being
implemented.

For more information visit
yourvoiceourcoast.com/tcla

Coastal Lagoons

B Wamberal Lagoon
2019-20 **C** 2020-21 **C** 2021-22 **B**



Overall water quality within Wamberal Lagoon improved from fair to good in 2021-22. This change was a result of improvements in both turbidity and chlorophyll-a scores, with the turbidity score improving from poor to good. Average turbidity was higher at the upstream site while chlorophyll-a was slightly higher at the downstream site. There was one exceedance of each trigger value (turbidity and chlorophyll-a) during December 2021.

C Terrigal Lagoon
2019-20 **C** 2020-21 **C** 2021-22 **C**



Overall water quality within Terrigal Lagoon remained as fair in 2021-22, despite poorer scores for both indicators. Turbidity exceeded the trigger values for all but one occasion throughout the sampling period, hence the poor grade. The average chlorophyll-a concentration in the samples increased during this sampling period, exceeding the trigger value on all sampling occasions and was graded as fair. For information on the implementation of the water quality and catchment audit at Terrigal Beach, Terrigal Haven and Terrigal Lagoon visit yourvoiceourcoast.com/tcla.

C Avoca Lagoon
2019-20 **F** 2020-21 **B** 2021-22 **C**

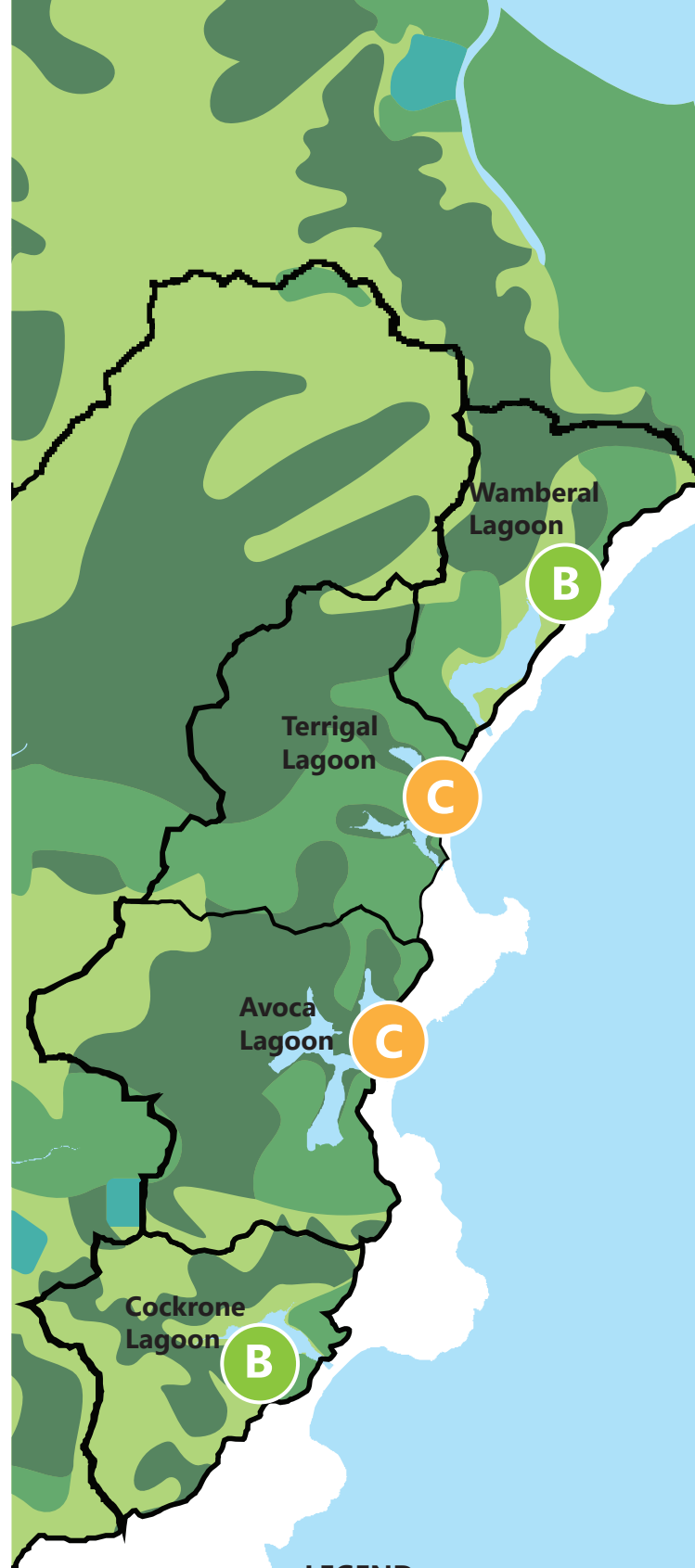


Avoca Lagoon water quality decreased to fair in 2021-22 after its elevation to a good grade the previous year. The addition of a third monitoring zone (which will continue to be monitored) in the northern part of the estuary did not change the overall grade. The trigger value for turbidity was exceeded on all but one sampling occasions across the estuary. The trigger value for chlorophyll-a was exceeded in 40% of samples, and this grade remained good. 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.

B Cockrone Lagoon
2019-20 **A** 2020-21 **A** 2021-22 **B**



The overall grade for Cockrone Lagoon returned to good in 2021-22. There were minor exceedances of the trigger values for turbidity towards the end of the sampling period and one moderate exceedance of the chlorophyll-a trigger value in March 2022 following significantly higher than average rainfall.



LEGEND

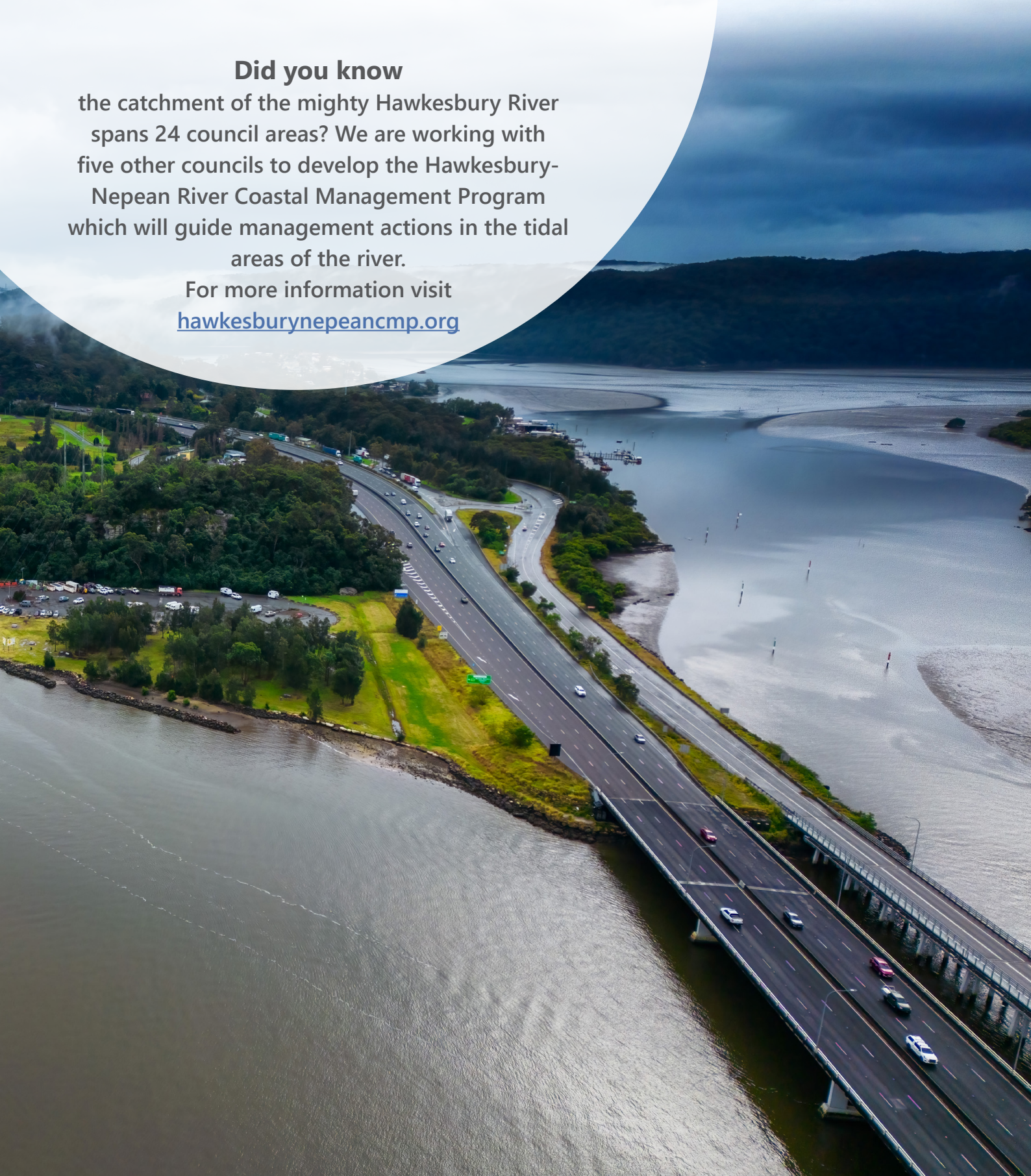
- Industrial/Commercial
- Urban
- Rural
- Natural Area
- Water

S Seagrass depth range is not measured in the coastal lagoons

Did you know

the catchment of the mighty Hawkesbury River spans 24 council areas? We are working with five other councils to develop the Hawkesbury-Nepean River Coastal Management Program which will guide management actions in the tidal areas of the river.

For more information visit hawkesburynepeancmp.org



Lower Hawkesbury River



LEGEND

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

B Patonga Creek
2019-20 **A** 2020-21 **A** 2021-22 **B**



Overall water quality within Patonga Creek declined from excellent to good in 2021-22. There was only one trigger value exceedance for turbidity during the sampling period, however there were three exceedances of the chlorophyll-a trigger value which resulted in the overall grade dropping from excellent to good.

C Mullet Creek
2019-20 **B** 2020-21 **B** 2021-22 **C**



Overall water quality in Mullet Creek decreased from good to fair in 2021-22. The trigger value was exceeded on all sampling occasions, however most exceedances were relatively minor. The chlorophyll-a trigger value was also exceeded on all occasions, including one large exceedance which was three times the trigger value. As seen previously, most exceedances for turbidity were recorded at the downstream site, with turbidity recorded at the upstream site generally close to or just above the trigger values.

D Mooney Mooney Creek
2019-20 **C** 2020-21 **C** 2021-22 **D**



Overall water quality within Mooney Mooney Creek decreased from fair to poor in 2021-22. At both upstream and downstream sites, turbidity and chlorophyll-a exceeded the trigger values on all sampling occasions. A decrease in the chlorophyll-a grade was observed as a result of multiple substantial exceedances of the trigger value.

B Mangrove Creek
2019-20 **C** 2020-21 **B** 2021-22 **B**



Overall water quality in Mangrove Creek remained good in 2021-22. This was despite a drop in the chlorophyll-a grade from excellent to fair, with the trigger value being exceeded on all but two sampling occasions. On two of these occasions, chlorophyll-a was more than double the trigger value. Turbidity exceeded the trigger value on all but one occasion, however the majority of these exceedances were relatively minor.

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:

- Progressed into Stage 2 and 3 of our Coastal Management Programs for our estuaries and open coast in partnership with our neighbouring Councils and the NSW Government – yourvoiceourcoast.com/waterways
- Implemented the recommendations of the Terrigal and Coastal Lagoon Audit by delivering significant on-ground works to resolve water quality issues – 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.
- Removed 52.6 tonnes of marine debris from waterways with the assistance of Clean4Shore.
- Upgraded existing stormwater quality improvement devices at Blue Haven and Buff Point 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 520 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, 194 tonnes of sediment, rubbish and priority weeds were removed along with management of vegetation to allow the water to flow.
- Removed just under 8,500m³ of excess seagrass wrack and floating algae from Tuggerah Lakes. In addition to this, a total of 304 tonnes of material was collected from the foreshores following the March 2022 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

- 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!
- Help keep blooms in your garden and not in our waterways – runoff containing excess nutrients makes its way into our waterways where it can cause algal blooms. By reducing the amount of fertiliser you use on your lawn and garden, or by planting a native garden which doesn't need as much fertiliser, you can help to minimise blooms of the algal kind.
- Keep calm and wash your car – on the grass though, not on your driveway. Or better still, use a car wash where the wastewater is recycled and treated. Did you know that washing cars on the driveway leads to all those soapy bubbles and chemicals ending up in our waterways? They are great to keep your car sparkly but not so great for our aquatic environments.
- 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 spread the good news - Search "Central Coast Waterways" on YouTube to find our dedicated playlist.
- 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 – the seagrass meadows in our estuaries can get scars that often take a long time to heal? Seagrass scarring is usually caused by boats entering shallow water, where propellers can cut into the lakebed and destroy the seagrass root systems. You can help protect our important seagrass meadows by not driving your boat over live seagrass, trimming your motor up and idling if you do find yourself over a seagrass meadow or by getting into the water while wearing protective footwear to push your boat back out to deeper water.



**PICK UP AFTER
YOUR PET!
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

(October 2022)

More Information

centralcoast.nsw.gov.au/tuggerahlakesestuary

centralcoast.nsw.gov.au/waterwayhealth

loveourwaterways.centralcoast.nsw.gov.au

environment.nsw.gov.au/topics/water/water-quality

waterquality.gov.au/anz-guidelines

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Photography – Dave Gosling, David Ross, Gerard Satherely



Central
Coast
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