TWEED
SHIRE COUNCIL

Tweed Waterways Report 2020

Connected by water:
Through the landscape and time

Contents

The Tweed's waterways are a treasured feature of our environment and Council is committed to managing them as healthy ecosystems supporting lifestyles, culture and productivity.

Management of our waterways requires balancing economic activity, recreational use and environmental protection. These elements are interconnected and are all crucial for the well-being of individuals, businesses and the broader community.

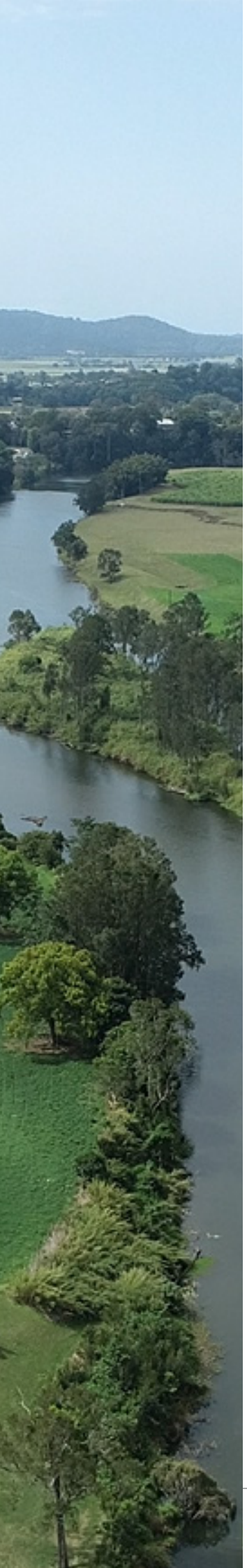
Council regularly monitors water quality at numerous locations throughout the Tweed Shire and this is a very useful indicator of the health of our waterways.

River health also relies on factors such as abundant habitat for fish and marine wildlife, and litter-free waterways for recreational and commercial river users.

The 2020 Tweed Waterways Report looks at this year's water quality monitoring report card scores along with current initiatives being undertaken throughout the Shire.

The findings reinforce our understanding of the health of our waterways and guide their ongoing management by Council and the Tweed community.

www.tweed.nsw.gov.au/waterwaysmanagement



Understanding water quality

This report card rates the quality of waterways across the Shire against compliance with the NSW Water Quality Objectives.

> *"Water quality is usually defined by the physical, chemical, biological and aesthetic (appearance and smell) characteristics of water. Good water quality is essential to the health of our aquatic habitats."* – NSW Department of Planning, Industry and Environment (NSW DPI&E)

What are the NSW Water Quality Objectives?

> *"The NSW Water Quality and River Flow Objectives …recognise the environmental values and uses people want protected in their waterways.*
>
> *The Objectives…help us assess whether the current condition of our waterways supports the values and uses people want protected."* – NSW DPI&E

Which water quality indicators are monitored?

The water quality indicators used within Council's waterways monitoring program are:

Water Quality Indicator	Unit	NSW Water Quality Objectives	
		Lowland Rivers	Estuaries
Dissolved Oxygen (DO)	% saturation	85-110%	80-110%
Acidity (pH)	pH	6.5-8.5	7.0-8.5
Turbidity	NTU	6-50	0.5-10
Total Nitrogen (TN)	mg/L	0.350	0.300
Total Phosphorus (TP)	mg/L	0.025	0.030
Chlorophyll a (Chl a)	ug/L	5	4
Enterococci (Bacteria)	cfu/100ml	Primary Contact	Secondary Contact
		35	230

Acidity and dissolved oxygen affect the suitability of habitat for aquatic animals like fish, turbidity tells us about the clarity of the water, total nitrogen and total phosphorus help us understand if nutrients are entering the water via rainfall runoff, and algae concentration tells if we have an algae problem.

The NSW Water Quality Objectives assign 'trigger values' for each indicator and these are shown in the table above.

If these values are exceeded then further investigation is required due to the potential for harmful environmental effects to occur.

Changes in specific indicators can help to identify the likely cause(s) of poor water quality results.

The acceptable quantity of each of these indicators found in a water body varies according to the water body type (creek, river, estuary, etc) and the activity for which it is intended to be used.

For example, the trigger values for Enterococci (a pathogen found as the normal intestinal flora of humans and animals) are much lower for primary contact activities, such as swimming, than for secondary contact activities like boating, wading and fishing.

Data for this program is collected by Council's Tweed Laboratory Centre and the results are measured against the guidelines set out in the Tweed River Water Quality Objectives.

Natural variables that influence the results

A number of natural variables influence the results obtained by water quality testing including the time of day (i.e. the amount of sunlight interacting with aquatic biota and processes), water temperature, tidal flushing, and most notably, rainfall.

The quantity, frequency and intensity of rainfall has a significant influence on the loads of sediment, nutrients and pathogens being washed off the land and into our waterways.

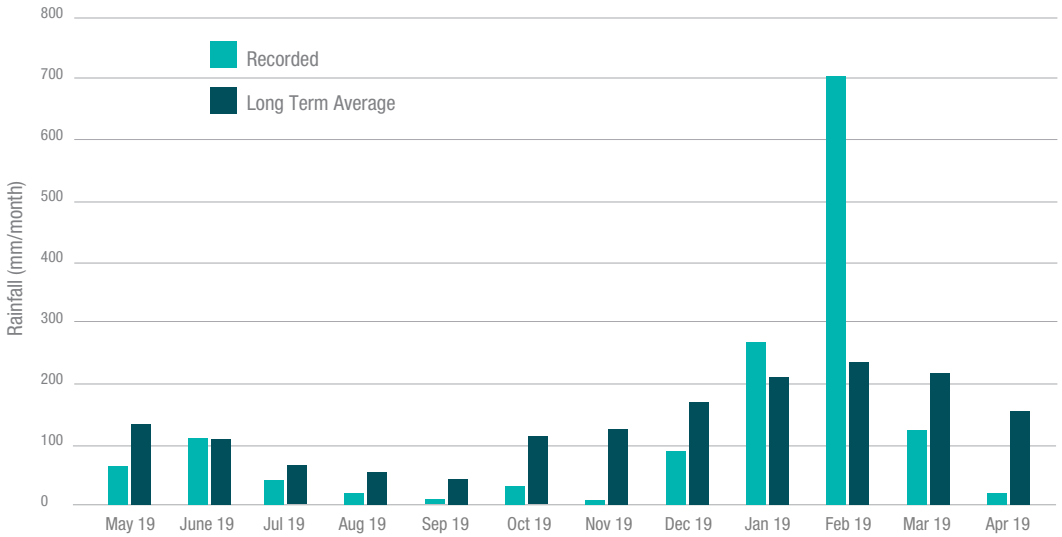
Influence of rainfall on Tweed's 2019-2020 monitoring results

Whilst the Tweed Shire experienced the worst drought in recorded history during the early months of the 2019-2020 monitoring period (May 2019-April 2020), the total annual rainfall recorded was 1452.5mm, which is 92% of the shire's long-term average annual rainfall of 1583.6mm.

On a monthly scale, January and February (2020) were the only months where the long-term monthly averages were exceeded and the combined total rainfall for these two months accounted for 66% of total annual rainfall.

Almost half (48%) of the total annual rainfall was received in February, alone, during a significant flood event. Because the testing period for this report is short, the water quality scores are more significantly influenced by a single large flood event than if it were for a long-term monitoring program.

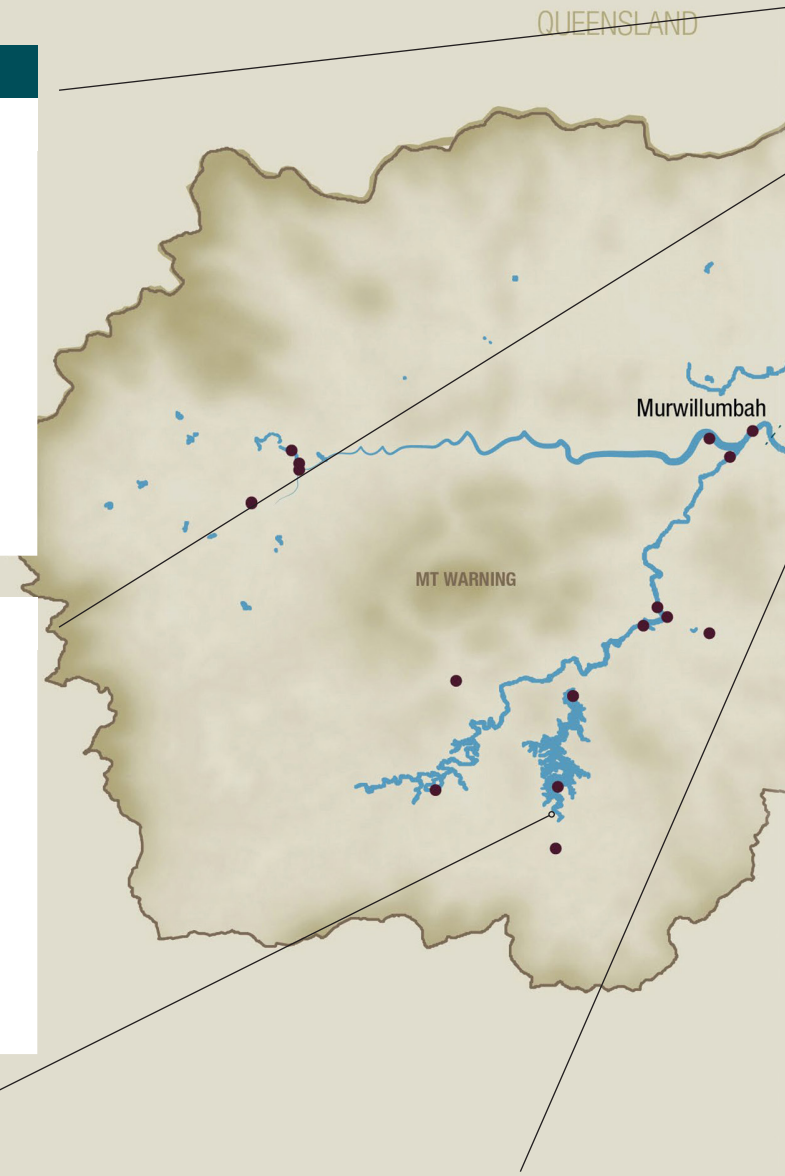
Murwillumbah rainfall statistics



Water quality report card scores

Overall there was no significant change in water quality between the 2019 and 2020 monitoring programs.

The only exception was in the Tweed Mid and Upper Estuary where the grade improved from C to B.



Cobaki-Terranora

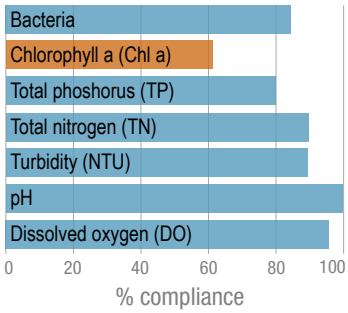
Terranora Inlet and Broadwaters

including Terranora Creek

2020

A

87%



2019 A (87%)

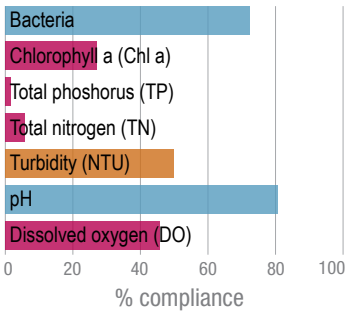
Upper Cobaki-Terranora

Duroby, Bilambil, Cobaki and Piggabeen Creeks

2020

D

41%



2019 D (37%)

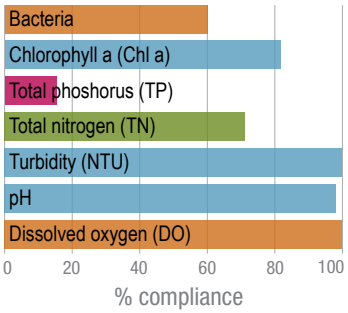
Upper catchment (freshwater)

Tweed, Oxley and Rous Rivers

2020

B

69%



2019 B (68%)

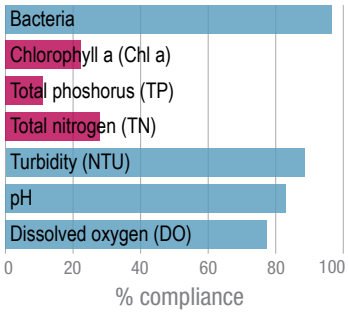
Rous estuary

Rous river estuary

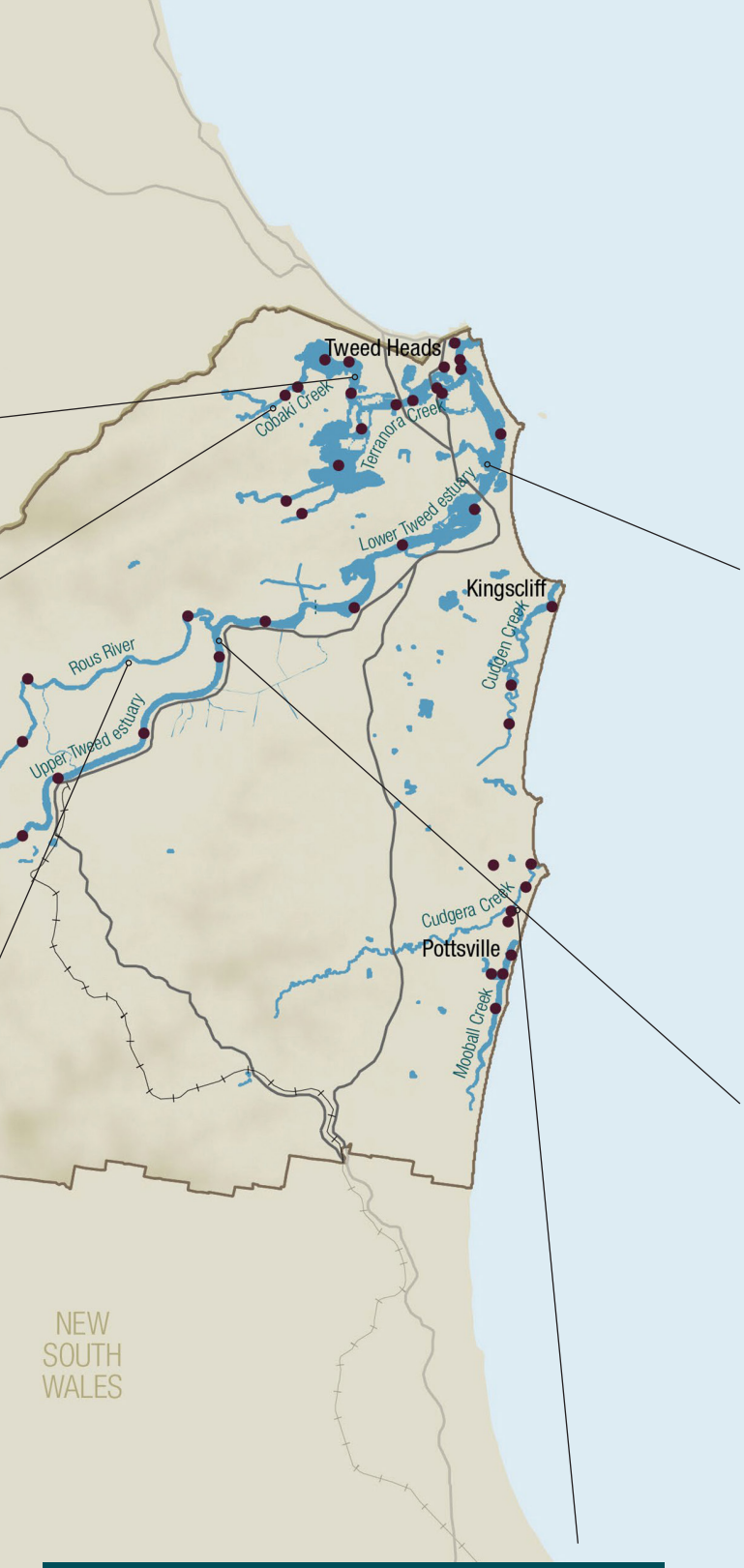
2020

C

58%



2019 C (65%)



Key

- Water quality sampling sites
  See bottom right for scoring legend

Tweed estuary

Tweed lower estuary

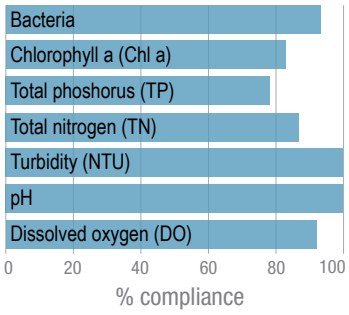
downstream of Chinderah

2020

A

90%

2019 A (93%)



Tweed mid and upper estuary

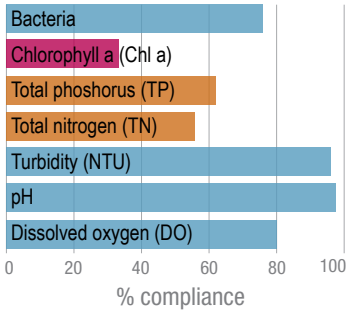
Chinderah upstream to Murwillumbah

2020

B

71%

2019 C (61%)



Coastal creeks

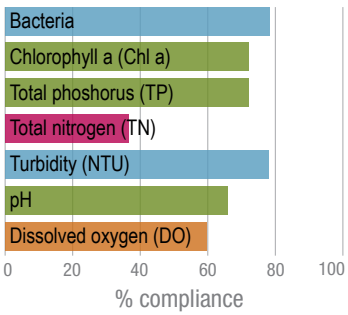
Cudgen, Cudgera and Mooball Creeks

2020

B

65%

2019 B (70%)



Scoring legend

A	**Good** – Average of greater than 75% compliance with NSW water quality objectives
B	**Moderate** – Average of 65–75% compliance with NSW water quality objectives. One or more water quality parameter does not comply, most do.
C	**Fair** – Average of 50–64% compliance with water quality objectives.
D	**Poor** – Average of less than 50% compliance with NSW water quality objectives. Most of the parameters sampled do not comply with objectives.

Water quality report card scores explained

Terranora Inlet and Broadwaters: Good overall water quality

- These waterways have a high standard of water quality due to effective tidal flushing.

Upper Cobaki and Terranora Broadwater tributaries: Poor overall water quality

- All water quality attributes, with the exception of acidity and bacteria, contributed to poor compliance with NSW Water Quality Objectives. The key indicators, continually exhibiting the lowest compliance were total phosphorus (2%), total nitrogen (6%) and algae concentration (27%) indicating that more needs to be done to manage sediment and nutrient loads from the upper catchments of Cobaki, Piggabeen, Bilambil and Duroby Creeks.
- Although 73% of water quality samples within the estuary reaches of Cobaki, Piggabeen, Bilambil and Duroby Creeks met bacteria concentration guidelines for secondary contact activities like boating and fishing where there is a low probability of water being swallowed, only 13% of samples would be considered suitable for primary contact activities like swimming.

Upper Tweed River Freshwater Catchment: Moderate overall water quality

- The primary water quality indicator with a much lower than desired result was total phosphorus, at only 9% compliance. Erosion of rich volcanic soils in Tweed's upper catchments contributes to the concentration of phosphorus in these waterways, however, this result also indicates that agricultural run-off continues to be of particular concern in these areas.
- Whilst 60% of water quality samples within the upper catchments met bacteria guidelines for secondary contact activities like fishing, only 13% would meet primary contact guidelines for bacteria. This reflects the impact that cattle access to waterways has on water quality and indicates that a number of locations in the Upper Catchment may not be suitable for swimming.

Rous Estuary: Fair overall water quality

- The water quality indicators exhibiting lowest compliance with objectives were total phosphorus (11%), algae concentration (22%) and total nitrogen (28%). High concentrations of nutrients can occur in waterways with insufficient native vegetation on the riverbanks. Healthy forested river banks reduce the movement of nutrients and soil from the land to the waterways during rainfall events and protect banks from erosion during floods.
- As a result of the extreme drought conditions in the early portion of this monitoring period, there was very little flushing of the Rous, so nutrient concentrations were even higher. There is an ongoing need for management of sediment and nutrient loads entering the waterway throughout this catchment.

Tweed Lower Estuary: Good overall water quality

- The lower Tweed River Estuary exhibits a high standard of water quality however this waterway is being increasingly impacted by high levels of recreational use.

Tweed Mid and Upper Estuary: Moderate overall water quality

- The water quality indicators exhibiting poor to fair compliance were algae concentration (32%), total nitrogen (55%) and total phosphorus (62%). This reinforces the need for the reduction of nutrient loads from upper catchment.

Coastal Creeks: Moderate overall water quality

- A number of coastal creek water quality indicators deteriorated during the 2019-2020 monitoring period. The impact of Tweed Shire's worst drought in recorded history during the early months of monitoring, followed by a large flood and blackwater events, significantly affected water quality compliance in the coastal creeks systems.
- The two indicators achieving the least overall compliance with NSW Water Quality Objective, using the combined data of all three coastal creeks, were total nitrogen (36%) and dissolved oxygen (60%).

Total Nitrogen

Excessive nutrients in a waterway can cause problematic plant and algae growth, resulting in low dissolved oxygen concentrations. While a significant number of total nitrogen and dissolved oxygen samples were found to be outside of the recommended range, these waterways were not found to be impacted by serious algal blooms during this monitoring period.

Dissolved Oxygen

The concentration of dissolved oxygen in a water body is influenced by many physical, chemical and biological factors. These include the time of day, depth of water, water temperature, biological activity and tidal flushing.

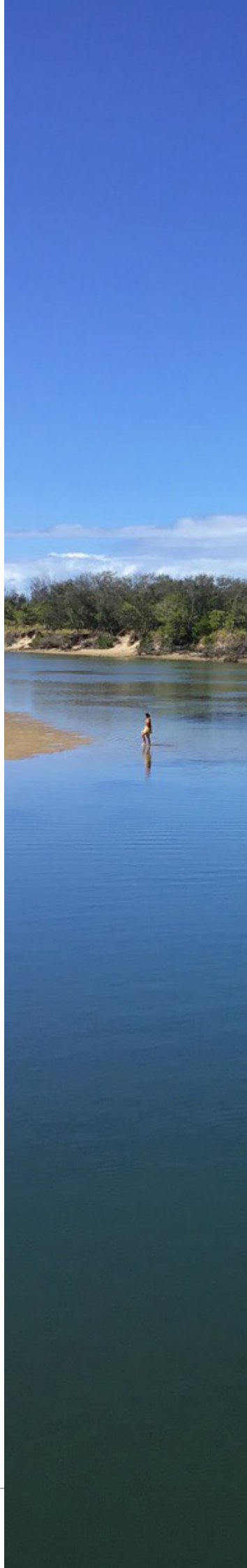
Low oxygen concentrations can indicate excessive nutrients and plant growth, whilst too much oxygen can suggest lots of biological activity by organisms such as microalgae. The dissolved oxygen concentration in a water body also influences the suitability of habitat for aquatic animals that need to breathe underwater, such as fish.

Fish Kills

Blackwater events occur when flood waters pond within low lying paddocks, killing the inundated pasture grasses. Bacteria then consumes the dead vegetation, removing oxygen from the floodwaters in the process. When the oxygen-depleted floodwater flows into creeks it can lead to a rapid change in oxygen levels and the suffocation of aquatic animals. The Tweed's February 2020 flood event resulted in blackwater events that seriously impacted water quality and caused fish kills in each of our coastal creeks.

Bacteria

Council has tested water samples from our coastal creeks and determined that while there are sometimes elevated levels of bacteria present, it is not of human origin. There is a high level of compliance with water quality objectives for bacteria at test sites near where most people swim. Bacteria present in water samples from our coastal creeks may be related to wildlife in the catchment, livestock or shore birds roosting on intertidal sand banks.



THE PAST: How we used the river then

Tweed Shire Council acknowledges the local Aboriginal people of the Bundjalung Nation who have lived in and derived their physical and spiritual needs from the forests, rivers, lakes and streams of this beautiful valley over many thousands of years as the traditional owners and custodians of these lands.

Throughout history, the Tweed River and its tributaries have been heavily affected by natural processes including large flood events.

Since the arrival of European settlers, the landscape and waterways have also been rapidly and dramatically altered by activities in various parts of the catchment.

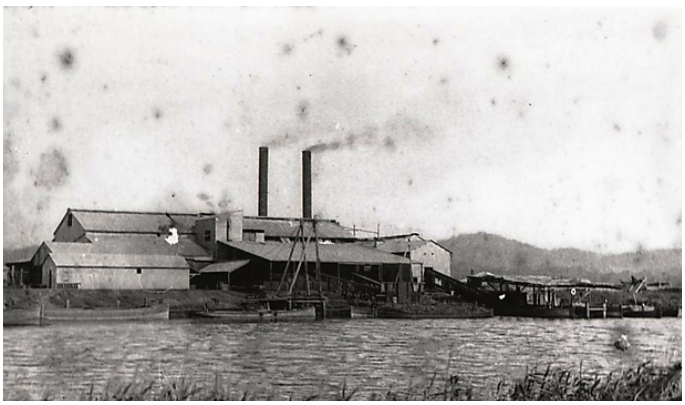
Historical changes to the landscape, most notably the clearing of vast tracts of native vegetation, continues to impact our water quality in much the same way that the activities we undertake today can influence the health of our catchment now and into the future.

Upper Freshwater Catchments

Timber getters (1840s)

Bullock team towing cedar logs upper reaches of Tweed River, Uki. Hector Hall in the foreground; Jim Harper standing in the water; Bunny Rabjones on the far bank.

Tweed Regional Museum Collection. No: TH74-03

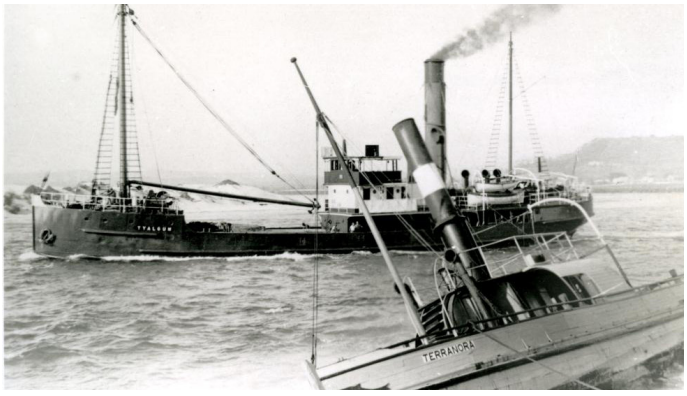


Tweed Mid and Upper Estuary

Sugar cane (1870s)

Condong Sugar Mill c1897.

Tweed Regional Museum Collection. No: TH38-13



Tweed Lower Estuary

Shipping/Steamboats (1830s)

The Tyalgum passing the wreck of the Terranora, 1933.

Tweed Regional Museum Collection K476

Rous River

Dairy farming (1890s)

Arthur Loder's dairy farm 'Kniveton Wood', milking time, 1894.

Tweed Regional Museum Collection No: TH91-04

Terranora-Cobaki Upper System

Bananas (1900s)

Drewe Leigh in banana farm, spraying bananas with backpack, pads on shoulders, 1934.

MUS2014.30.82.

Terranora Inlet & Broadwaters

Dredging to allow cane & banana transport boats access (1950's)

Dredge working in Terranora Inlet opposite Pioneer Park, where the building for Tweed Heads Historical Society stands.

Photo: Frank McCray (15/10/1958) MUS2014.14.1

Coastal Creeks

Historical sand mining along Tweed Coast (1939-1970)

Sand mining dredge at Cudgen circa 1958.

Photo: courtesy of Iain Todd.

THE PRESENT: How we use the river now

Recognising the many and increasing demands that we are making of our waterways today.

Upper Freshwater Catchments

Commercial use

- Bananas
- Beef and dairy farming

Recreational use

- Fishing
- Kayaking
- Socialising & relaxation

Key pressures

- Stock access to waterways causing bank erosion, and increased sediment, nutrients and bacteria in creeks and rivers.

Tweed Estuary

Commercial use

- Sugar cane
- Oyster leases
- Commercial fishing
- River cruises
- House boats
- Aquatic tourism
- Urban development

Recreational use

- Water skiing
- Wakeboarding
- Jet skis
- Kayaking
- Boating
- Sailing
- Fishing
- Swimming
- Socialising & relaxation

Key pressures

- High levels of recreational use, including conflicts between use types and litter.
- Limited access to the river foreshore, particularity a lack of sandy beaches.
- Bank erosion.
- A lack of native river bank vegetation and degraded fish habitat.

Coastal Creeks

Land use

- Agriculture
- Urban development

Recreational use

- Fishing
- Swimming
- Kayaking
- Socialising & relaxation

Key pressures

- Nutrient, sediment and organic matter delivered from upstream to coastal creeks.

THE FUTURE: We all have a role to play

Projects that Council are undertaking to protect the catchment & waterways and ways the Tweed

Upper Freshwater Catchments

- The reduction of bank erosion, agricultural run-off and stock access to waterways are central themes to a number of projects that Council, in collaboration with private landholders, are addressing in the Upper Catchments via the River Health Grants Program.

Before

After

Tweed Upper Estuary

- Council's Waterways Management team recently collaborated with private landholders, local bush regenerators and the Tweed chapter of OzFish Unlimited to complete a combination of river bank stabilisation works, riparian revegetation, cattle exclusion fencing and fish habitat creation in the Tweed Upper Estuary.

Before

After

Fish hotel structures

Recycled tree stumps as fish habitat

Tweed Mid Estuary

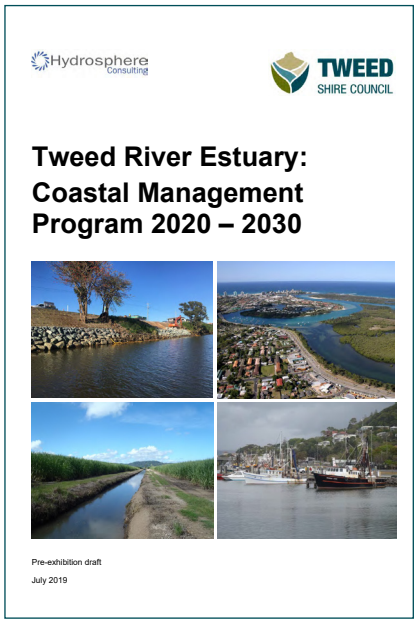
- In the Tweed Mid Estuary, fish habitat mapping has been undertaken, using side-scan sonar, to assess the quantity and diversity of fish habitat material. This information will allow Council to incorporate a diverse range of fish habitat, for enhanced ecosystem function and visual amenity of the river, when planning future river bank stabilisation projects.

community can pitch in.

Tweed Lower Estuary

- Council supports the River Warriors initiative, a core project for Positive Change For Marine Life, that aims to develop a culture of stewardship for waterways as places of incredible ecological, recreational and economic importance. In the coming months, River Warriors will be conducting fortnightly pilot marine debris surveys on the Tweed River and results will be published in a Marine Debris Report Card.
- Members of the Tweed community are reminded to dispose of fishing line and plastic bags appropriately and to take them home, where possible, as these are commonly found in river and marine debris accumulations.

- For more information regarding current management actions in the Tweed Estuary please read the Tweed River Estuary CMP 2020-2030



Terranora Inlet & Broadwaters

- In March 2020, Council installed a SeaBin 'trash skimmer' at the Tweed Heads Marina to help address the issue of plastic debris entering estuary and marine environments.

Coastal Creeks

- The ongoing management of sediment, nutrient and organic loads from upstream and adjacent catchments is being addressed by Council's Sustainable Agriculture Small Grants Program.