NRM North

Tamar Estuary and Esk Rivers

Natural Resource Management in Northern Tasmania

TAMAR ESTUARY 2018 REPORT CARD

ECOSYSTEM HEALTH ASSESSMENT PROGRAM

MONITORING PERIOD DECEMBER 2016 – NOVEMBER 2017

The methodology used in this report has now been superseded. Please see the 2020 Tamar Estuary Technical Report for more details

'Working together for healthy waterways'

Tamar River | kanamaluka

Cover Photo: Horseshoe leatherjacket - Meuschenia hippocrepis, Tamar River estuary

Vision for the Tamar Estuary
AND ESK RIVERS SYSTEMS 2030

'Healthy, productive, valued and enjoyed – Our Rivers Of Life'

KEY MESSAGES

- The 2018 report card grades have been affected by the extreme weather conditions in 2016 and 2017. June 2016 saw the largest flood since 1969 occurring around Launceston which delivered high pollutant loads to the estuary from the catchment, followed by a warmer and drier than average autumn in 2017.
- The incoming tide traps pollutants in the upper and middle estuary. This combined with a warm and dry autumn provided ideal conditions for the growth of algae. This is reflected in the grades with large increases in chlorophyll-a (a measure of algal growth) and subsequent decreases in dissolved oxygen in the estuary driving declining grades in zones 2, 3, 4 and 5.
- The grade for zone 1 remains unchanged in comparison to the 2016 report card with a 'D' grade indicating 'poor ecosystem health'.
- High rainfall is a key driver of pathogen levels. Pathogen levels in the 2018 report card show an increase in comparison to the 2016 report card, particulalry at site 2 near Kings Wharf. Long term trends for pathogen levels in the upper Tamar River estuary show an overall improvement since the 1970s resulting from improved treatment of sewage, trade waste and upgrades to the combined sewage and stormwater system.
- Metals are generally within water quality targets across all zones of the estuary. Isolated issues with elevated aluminium occur in zones 1 and 4. Zones 1 and 2 have high levels of arsenic. This is most likely due to urban stormwater run-off, sewage treatment plant discharges, historic mining and resuspension of previously settled metals.

RECREATIONAL MESSAGES

It is not safe to harvest and consume wild shellfish from the Tamar River estuary.

Avoid swimming in the Tamar River estuary for at least three days following heavy rainfall and check for current warnings, signs and information from councils and the Department of Health and Human Services (DHHS) regarding swimming at local swimming sites.

It is recommended that servings of fish caught from the Tamar River estuary are limited to 2-3 serves per week.

WHERE DO POLLUTANTS COME FROM?

The Tamar River estuary's catchment drainage area is approximately 10,000 km^2, representing 15% of Tasmania's landmass, and comprises a mix of land uses including urban, agricultural, forestry and natural conservation areas (Figure 1). Diffuse and point sources of pollutants to the Tamar River estuary place pressure on the health of the aquatic ecosystem and its use for recreational and agricultural purposes.

The TEER Program released the TEER Water Quality Improvement Plan in 2015. This plan identified that diffuse pollutant loads account for the greatest percentage of loads delivered to the Tamar River estuary, contributing approximately two thirds of the nitrogen, over half of the phosphorous, almost all of the suspended solids and over two thirds of the pathogens.

Point source pollutant loads from sewage treatment plants (STPs) and industry account for approximately one third of the of the total phosphorous, one quarter of the total nitrogen and small proportions of the total suspended solids (sediments) and enterococci bacteria in the Tamar River estuary.

A further contribution of pathogens to the estuary arises from combined system overflows (CSOs). The combined system carries sewage and stormwater in a single pipe network to be treated at Ti Tree Bend sewage treatment plant. CSOs occur when excess flows beyond the capacity of the system's pipes and pump stations discharges directly to the estuary during rainfall.

Further information on catchment pollutant loads can be found in the 2018 Report Card Fact Sheet.

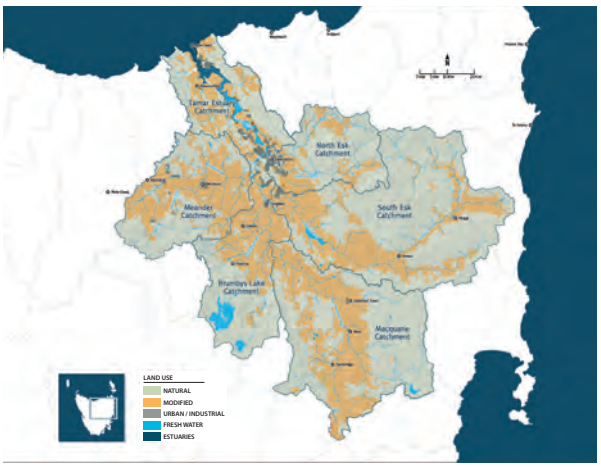


FIGURE 1: TAMAR CATCHMENT MAP

PATHOGENS

High levels of pathogens in water limit recreational amenity due to public health risks. Recreational water contaminated by human and animal waste may contain a range of pathogens such as bacteria, protozoa and viruses.

Pathogen levels in the Tamar River estuary are influenced by rainfall, overflows from the combined sewage-stormwater system, and run-off from urban and agricultural areas. Pathogen concentrations often peak after rainfall especially near stormwater outfalls.

During 2017, there were no instances of levels exceeding the primary contact limit (<140/100ml) outside of zone 1 (Figure 2). In zone 1, the limit was exceeded in January and from May to September, following rainfall events. The pathogen levels in zone 1 for the 2018 report card period have increased in comparison to the 2016 report card period, particularly at site 2 near Kings Wharf.

Further information on pathogens can be found via the Department of Health and Human Services and the 2018 Report Card Fact Sheet.

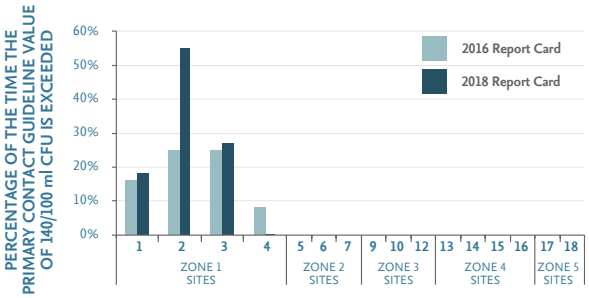


FIGURE 2. EXCEEDANCE OF PRIMARY CONTACT RECREATIONAL GUIDELINE

Note: Data for 2015 is used to derive the 2016 report card grades and data for 2017 is used to derive the 2018 report card grades

METALS

Metals naturally occur in aquatic environments from the weathering of rocks and sediments. Human activities may elevate the level of metals above safe concentrations for aquatic ecosystems and public health. Human activities which contribute metal contaminants to waterways include: historic mining, urban stormwater, industrial discharges from smelting, discharges from sewage treatment plants (particularly trade-waste) and pollutants washed off roads from vehicle exhausts, fuels and oils.

Metals from historic activities are also buried in bottom sediments in the estuary. Agitating these sediments has the potential to resuspend metal contaminants into the water column.

Past report cards have relied on a simplified set of metal data observations focused largely on zone 1, where there is a known history of metal contamination. In 2017, additional metal data was collected across all zones of the estuary.

Figure 3 shows the observations of different metals in each zone which exceeded water quality targets. Zones 3 and 5 are within targets for all metals 100% of the time. Observations of lead, cadmium, copper and zinc did not exceeded targets in any zone. Zone 4 has all metals within targets except aluminium which exceeds targets for less than 10% of observations. Zone 2 is within targets for all pollutants except arsenic which fails to meet the target for 45% of observations.

Zone 1 is known to have a history of metal contamination due to the direct input of pollutants from urban areas, sewage treatment plants and historic mining. The strong incoming tide traps pollutants in this zone. In zone 1, aluminium fails to meet the target for approximately 10% of observations and arsenic exceeds the target for all observations.

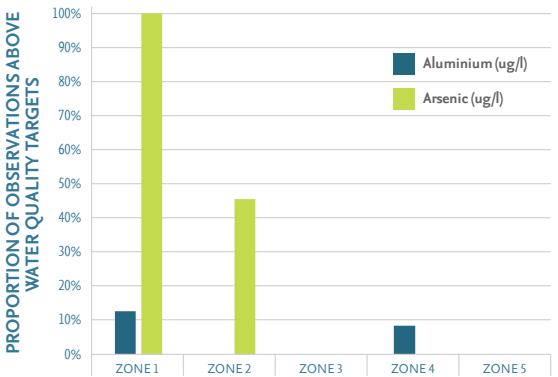


FIGURE 3: PROPORTION OF METAL OBSERVATIONS EXCEEDING WATER QUALITY TARGETS ACROSS ALL ZONES IN THE TAMAR RIVER IN 2017

Note: Observations of lead, cadmium, copper and zinc did not exceed the water quality targets for metals in any zone and have therefore not been included in Figure 3.

TAMAR ESTUARY
2018 REPORT CARD RESULTS

The 2018 report card has been produced using 12 months of Tamar River estuary ambient monitoring data from December 2016 to November 2017 at 16 sites along the length of the estuary.

In 2015, a new methodology was employed to calculate the grades. Key changes to the report card methodology included additional data for pollutant trends to describe the key pressures and the adoption of new locally derived water quality targets for the Tamar River estuary to replace the default Australian and New Zealand Environment Conservation Council (ANZECC) guidelines used in previous report cards.

The adoption of locally derived water quality targets represents best practice by replacing less specific default guidelines. In 2016, an additional change to the way the report card grades measure compliance with pH and dissolved oxygen was applied to ensure that the grades accurately reflect the condition of the Tamar River estuary. All past grades have been re-calculated using the new local water quality targets and methodology. Further information on the methods and results for the report card can be found on the TEER website.

SUMMARY

The 2018 report card shows an overall decline in grades compared to the 2016 report card. Grades have declined across all zones except for zone 1 (from Launceston to Legana), which remains unchanged with a D grade, 'poor ecosystem health'.

The decline in overall grades in the 2018 report card is most likely due to the extreme weather conditions preceding and during monitoring for the 2018 report card.

The major flood in June 2016- the largest flood in Launceston since 1969, delivered high loads of pollutants including nutrients, sediments, pathogens and metals to the Tamar River estuary.

The decline in the 2018 report card grades has been driven by increased chlorophyll-*a* concentrations (indicating increased algal growth) and lower dissolved oxygen levels during autumn and winter.

The 2018 report card illustrates the influence that extreme weather conditions can have on ecosystem health in the Tamar River estuary.

B

ZONE 5: MARINE ZONE

Good ecosystem health. Zone 5 is marine and generally well flushed. Water quality has declined compared to the 2016 grade of 'excellent'. The decline in water quality has been driven by increased concentrations of chlorophyll-*a*, decreases in pH and reduced dissolved oxygen through autumn and into winter. Dissolved oxygen only met the target 8% of the time compared to 88% in 2016. pH met the target 32% of the time compared to 64% in 2016. Metal levels met the target all of the time.

B-

ZONE 4: MARINE ZONE

Good ecosystem health. Zone 4 is marine and generally well flushed. Water quality has declined compared to the 2016 grade of 'excellent'. The decline in water quality has been driven by increased concentrations of chlorophyll-*a*, decreases in pH and reduced dissolved oxygen through autumn and into winter. In this zone, there was a sharp decrease in dissolved oxygen in autumn which remained low into winter, only meeting the target 23% of the time compared with 93% of the time in the 2016. pH also decreased meeting the target less than 50% of the time. Aluminum had an elevated reading on one occasion with metal levels otherwise meeting the targets.

B+

ZONE 3: ESTUARINE ZONE

Good ecosystem health. Zone 3 has consistently received 'good' to 'excellent' grades in past reporting years primarily due to the lack of urban and industrial development discharging directly to this zone. The grade for 2018 has declined in comparison to the 2016 grade from 'excellent' to 'good'. This change in grade has been driven by reduced dissolved oxygen and a spike in chlorophyll-*a* which persisted with elevated levels through autumn. Dissolved oxygen only met the target 33% of the time compared to 93% of the time in 2016. Metal levels met the targets all of the time.

C+

ZONE 2: ESTUARINE ZONE

Fair ecosystem health. Water quality has declined compared to the 2016 grade of 'good'. This change in grade has been driven by a spike in chlorophyll-*a* which persisted with high levels through autumn, as well as a sharp decrease in dissolved oxygen in autumn which persisted through winter. Chlorophyll-*a* met targets 50% of the time, compared to 60% of the time in 2016. Dissolved oxygen only met the target 34% of the time, compared to meeting the target all of the time in 2016. Metals met the targets all of the time with the exception of arsenic which only met the target 55% of the time.

D

ZONE 1: ESTUARINE ZONE

Poor ecosystem health. Zone 1 has consistently received 'poor' grades in past reporting years. Zone 1 is influenced by significant loads of pollutants delivered directly from the North and South Esk Rivers with discharges from sewage treatment plants, urban stormwater run-off and a twice daily tidal regime where strong tides trap pollutants in the zone. A slight decline in water quality in zone 1 was measured for the indicators of chlorophyll-*a*, dissolved oxygen, nutrients and pH, however the decline was not significant enough to have led to a decrease in the overall grade for 2018 which remains the same as in 2016. The 2018 grade has been strongly influenced by phosphorous only meeting the target 7% of the time, nitrogen 13% of the time, turbidity 3% of the time and chlorophyll-*a* 30% of the time. Elevated levels of metals are present, particularly arsenic which failed to meet the target all of the time and aluminum which exceeded the target 13% of the time.

FIGURE 4. TAMAR RIVER ESTUARY MAP

TABLE 1. COMPARISON OF PAST REPORT CARD GRADES

	2011 Report Card	2012 Report Card	2015 Report Card	2016 Report Card	2018 Report Card
Zone 5	A	B	A-	A	B
Zone 4	A-	B+	B+	A-	B-
Zone 3	A-	B+	A-	A	B+
Zone 2	B+	C	B	B	C+
Zone 1	C	C-	D+	D	D

IMPACT OF THE JUNE 2016 FLOOD EVENT

In June 2016, the Tamar River estuary experienced the largest flood since 1969. Flood frequency analysis available at the time of the flood indicates that the event was a 1 in 200 year flood in the North Esk River and a 1 in 50 year flood in the South Esk River. This flood event has had lasting effects on the ecosystem health of the Tamar River estuary and has resulted in a decline in grades in the 2018 report card in comparison to the 2016 report card.

The 2016 extreme wet conditions delivered high levels of pollutants to the estuary preceding the collection of 2018 report card data (Figure 5). Due to the strong tidal nature of the Tamar, many of these pollutants remained trapped in the estuary. Increased algal growth (measured by chlorophyll-a) and consequently, a drop in dissolved oxygen, were likely to have been influenced by the combination of the wet winter delivering high pollutant loads followed by a warm and dry summer and autumn, with lower river flows and warmer water temperatures. This is consistent with the pattern of increasing chlorophyll-a and declining dissolved oxygen observed in the 2018 report card monitoring period, driving the change in ecosystem health grades.

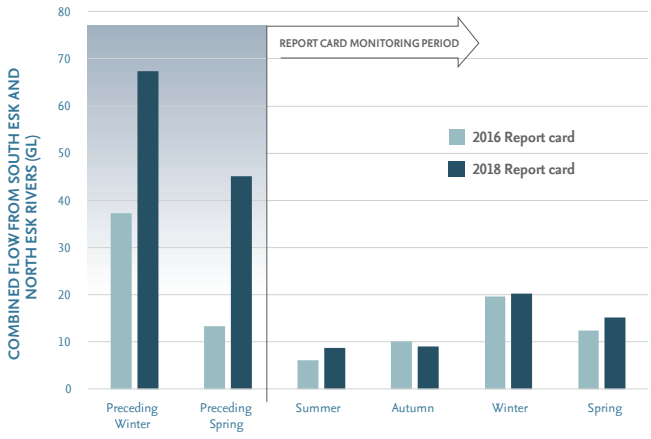


FIGURE 5. MONTHLY FLOW PRECEEDING AND DURING THE REPORT CARD PERIOD

DIRECT PRESSURES ON THE ESTUARY

URBAN LOADS AND TRENDS

SEWAGE TREATMENT PLANTS

There are 11 sewage treatment plants (STPs) located in close proximity to the Tamar River estuary. STPs treat domestic sewage and trade waste from surrounding townships. Once treated, wastewater is discharged for reuse such as irrigation, discharged to the estuary, or discharged to other connected waterways. Treated wastewater discharged from STPs contributes contaminants such as organics, toxicants, nutrients and suspended solids to the Tamar River estuary.

Situated in Launceston, Ti-Tree Bend is the largest of the STPs, and treats combined sewage and stormwater from the Launceston area. Five of the 11 STPs have reuse schemes for disposal of treated wastewater.

Figure 6 shows the nutrient (total nitrogen and phosphorous) and sediment (total suspended solids) loads estimated to have been discharged to the Tamar River estuary from 2011 to 2017.

The elevated discharge loads in 2016 are likely due to the increased rainfall in 2016, which led to increased volumes of water passing through STPs (eg. stormwater entering sewerage infrastructure through manholes) and a reduced demand for reuse of treated wastewater.

Elevated discharges of nitrogen in comparison to phosphorous in 2015, 2016 and 2017 may be linked to operational changes in 2015 to address odour management at the Ti-Tree Bend STP. These operational changes led to a reduction in phosphorous without a corresponding reduction in nitrogen.

In December 2016, TasWater signed a Memorandum of Understanding (MoU) with the Environment Protection Authority (EPA) regarding public wastewater management. This MoU has a duration of three years, and sets out the management and regulatory approach TasWater and the EPA will use to achieve a 20 per cent improvement in environmental compliance and performance for Tasmania's public wastewater management network over this period.

Under this MoU, TasWater will deliver projects at 33 STPs across the state which have been identified as sites that will yield the greatest environmental compliance and performance benefit; five of which are located in close proximity to the Tamar River estuary. Additionally, TasWater continues to work on preparation of the Launceston Sewerage Improvement Plan capital project as detailed in the TasWater Long Term Strategic Plan 2020-2026.

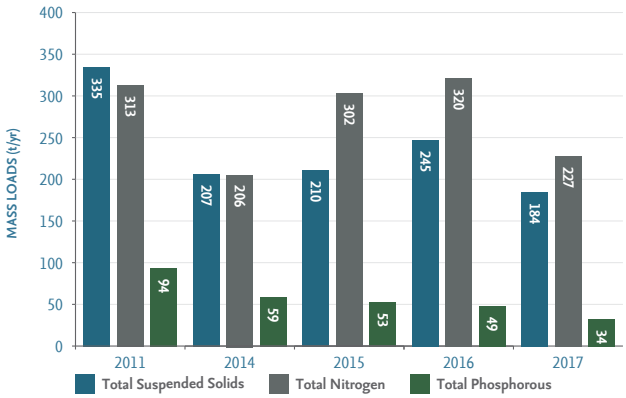


FIGURE 6. ESTIMATED AVERAGE ANNUAL LOADS FROM SEWAGE TREATMENT PLANTS DISCHARGING TO THE TAMAR RIVER ESTUARY

Note: Mass loads have been calculated based on average concentration for each parameter for each month of discharge to water, then multiplied by the total flow discharged to water for 2017. Figures do not include discharge to reuse or overflows from the combined sewer-stormwater system in Launceston.

STORMWATER

Urban stormwater is primarily rainfall that runs off impervious areas such as roofs, roads, footpaths and car parks entering drainage networks before being transported to waterways. The urban stormwater system contributes high loads of sediments and nutrients to the Tamar River estuary.

The sediment load from urban stormwater represents approximately 8% of the total load of sediments delivered to the estuary from less than 1% of the catchment area.

The stormwater data presented in this report card represents stormwater discharging directly from urban areas surrounding the Tamar River estuary and excludes stormwater from the combined stormwater and sewerage system from Launceston which enters the Ti-Tree Bend sewage treatment plant.

Figure 7 shows the influence of the relatively dry year in 2017. Stormwater pollutant loads correlate to intensity and duration of rainfall, less rainfall leads to smaller pollutant loads. Average rainfall in 2017 has resulted in less run-off from urban and rural land areas and consequently less pollutant loads entering the estuary in comparison to the exceptionally wet years in 2016 and 2011.

Past stormwater monitoring programs have identified that stormwater is also a source of metals (for example aluminum, arsenic, lead, copper and zinc) to the estuary, however a lack of data means that it is not possible to present information about metals transported to the estuary by stormwater.

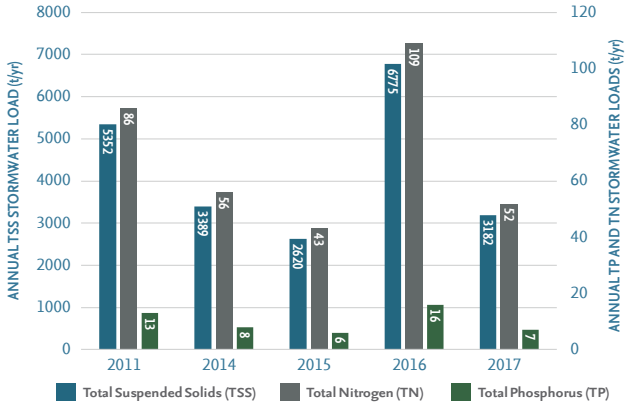


FIGURE 7. ESTIMATED ANNUAL STORMWATER LOADS TO THE TAMAR RIVER ESTUARY

SILT RAKING

Silt raking refers to the activity of agitating sediments on the bed and banks of the upper Tamar River estuary using a converted scallop dredge. The aim of the activity is to mobilise sediments in the Yacht Basin and around the Seaport area to improve recreational amenity, aesthetics and navigational access.

Under permit conditions, the Launceston Flood Authority (LFA) has been undertaking silt raking activities in the Tamar since 2013, predominately in the winter months on an outgoing tide when higher flows from the North and South Esk rivers carry sediments downstream.

The volume of sediment raked in 2016 was aided by the June 2016 flood event with a total of 304,532 m³ of sediment scoured from the Launceston Yacht Basin. During 2017, silt raking occurred from May through to August with less than half of the volume of sediment of the previous year moved (Table 2).

Silt raking is considered a pressure on water quality in the estuary due to the increased sediment it mobilises into the water column. Sediments contain contaminants such as heavy metals, bacteria and nutrients. Mobilising sediments can be expected to increase the level of contaminants in the water column.

Due to the nature of how different contaminants bind to sediments, there is variation in the quantity and type of contaminants that may be released into the water column and their impact on the environment.

Consistent long-term monitoring data on the impact of silt raking has not been collected. In 2017, TEER partners conducted monitoring for enterococci bacteria in the tidal reaches of the North Esk River and upstream at St Leonards during and in the absence of silt raking.

Data on several occasions indicated that in the absence of silt raking, enterococci bacteria levels were closely coupled or very similar at the estuarine North Esk site and the freshwater St Leonards site. Conversely, enterococci levels were significantly higher in the tidal North Esk site where silt raking was occurring in comparison to the upstream St Leonards site which was not impacted by silt raking.

While this data is not conclusive evidence of a correlation between silt raking and enterococci levels, it does illustrate the expected effect where the mobilisation of sediments has the potential to release contaminants back into the water column.

Due to the strong tidal asymmetry in the Tamar River estuary (where stronger incoming tidal flows occur over a shorter duration in comparsion to the outgoing tide), sediments rarely exit the mouth of the estuary and the majority of sediments mobilised during silt raking are redistributed within the system.

Additional data and assessment will be required before any long-term trends for water quality or ecological impacts from silt raking activities can be concluded.

TABLE 2. SEDIMENT VOLUMES MOBILISED PER YEAR CUBIC METRES (m³)

Note: Sediment volumes mobilised include sediments mobilised through silt raking or scouring during flood events or high flows

2012	2013	2014	2015	2016	2017
22,500 m³	200,000 m³	101,014 m³	25,500 m³	304,532 m³	131,434 m³

WHAT DO THE GRADES MEAN?

Ecosystem Health Report Card grades ('A' to 'F') are generated for five (5) zones in the Tamar River estuary. Parameters are assessed against local water quality targets for the Tamar River estuary resulting in a single grade for each zone. The Ecosystem Health Index (EHI) is a numerical representation of the extent to which a range of indicators meet or exceed water quality targets.

A **EXCELLENT** (EHI: 0.86 – 1.00)
Conditions frequently fall well within water quality targets across the range of all indicators measured.

B **GOOD** (EHI: 0.70 – 0.85)
Conditions frequently fall within or well within water quality targets with very few failing to meet water quality targets across the range of indicators measured.

C **FAIR** (EHI: 0.60 – 0.69)
Conditions frequently meet water quality targets with limited failures across the range of indicators measured.

D **POOR** (EHI: 0.50 – 0.59)
There are a mix of outcomes across indicators with some frequently failing and others meeting water quality targets.

F **FAIL** (EHI: <0.50)
Conditions frequently fail to meet the water quality targets for the majority of indicators, with at least some failing by more than 50%.

+/– **'+' and '–'** signs are included to indicate movement within the bands of the grade scores.

WHAT IS ECOSYSTEM HEALTH?

Ecosystem health is determined by the response of the environment to natural and human inputs and is defined as the degree to which the actual state of an ecosystem diverges from an ideal state as described in management objectives. A healthy estuarine and marine ecosystem will have the following characteristics: key processes operating that maintain stable and sustainable ecosystems, zones of human impacts that do not expand or deteriorate and aquatic ecosystems (critical habitats) which remain intact. As these characteristics are complex and can be difficult to measure, there are key water quality and biological indicators that can be measured and compared to acceptable levels and reference conditions.

WHY MONITOR?

It is important to monitor and understand the health of the Tamar River estuary so that natural resource managers can better evaluate the condition of our waterways and target investment and on-ground works to improve ecosystem health. The Ecosystem Health Assessment Program (EHAP) is used to evaluate the effectiveness of activities undertaken to improve water quality such as sewage treatment plant upgrades, addressing combined sewer overflows (CSOs) in the Launceston area, adoption of water sensitive urban design and sediment and erosion controls in urban areas and best practice catchment management activities.

TAMAR ESTUARY AND ESK RIVERS (TEER) PROGRAM

The TEER Program was established in 2008 and is a regional partnership between the agencies responsible for management of the Tamar River estuary and Esk rivers. A key goal of the program is to improve the scientific understanding of the issues impacting upon the health of the TEER waterways and use this to better identify and target priority areas requiring investment in on-ground works. The Water Quality Improvement Plan (WQIP) for the TEER waterways (a blueprint for improving water quality under current and future land use scenarios throughout the catchment), has been developed and is being used as a guide for improving water quality in the Tamar River estuary and its freshwater catchments. More information on the WQIP can be found on the TEER website www.nrmnorth.org.au/teer.

ECOSYSTEM HEALTH ASSESSMENT PROGRAM

The TEER Ecosystem Health Assessment Program (EHAP) is an initiative of the TEER Program. The EHAP covers an area extending 70 kilometres from the Tamar Yacht Basin at the confluence of the North and South Esk Rivers to the mouth of the estuary at Low Head. In 2016, the EHAP transitioned into a program of continous monthly monitoring of the estuary and publishing report cards every two years. TEER continues to focus on discrete projects to investigate issues impacting on the waterways and to implement activities in line with recommendations in the TEER Water Quality Improvement Plan.

The EHAP partners include; NRM North, Tasmanian Government, Environmental Protection Authority, Department of Health and Human Services, City of Launceston, West Tamar Council, Meander Valley Council, Northern Midlands Council, George Town Council, TasWater, Hydro Tasmania, Bell Bay Aluminium, Petuna Aquaculture, South32 TEMCO, University of Tasmania and Institute for Marine and Antarctic Studies (IMAS).

REPORT CARD

The 2018 report card uses a grading system of A through to F for five zones in the Tamar River estuary. The grades represent the overall health of the estuary from 16 monitoring sites using data collected monthly from December 2016 to November 2017. All seasons are captured over the 12 month period. Details on the data and methods used can be found via www.nrmnorth.org.au/teer.

NRM North
Tamar Estuary and Esk Rivers
Natural Resource Management in Northern Tasmania

FURTHER INFORMATION

TEER Program
P: (03) 6333 7777
E: admin@nrmnorth.org.au
W: www.nrmnorth.org.au/teer

Cover photo Horseshoe leatherjacket - *Meuschenia hippocrepis*. Photo courtesy of Matthew Butt.

PROGRAM PARTNERS

NRM North
Australian Government National Landcare Programme
Tasmanian Government
University of Tasmania IMAS
TasWater
EPA Tasmania Environment Protection Authority
Hydro Tasmania
Meander Valley Council
City of Launceston
Northern Midlands Council
West Tamar Council
Petuna by Peter & Una Rockliff
Bell Bay Aluminium
South32

180222-1 illus

NRM North

Tamar Estuary and Esk Rivers

Natural Resource Management in Northern Tasmania

CATCHMENT LOADS OF POLLUTANTS TO THE TAMAR RIVER ESTUARY

WATER QUALITY IMPROVEMENT PLAN

BACKGROUND

The Tamar Estuary and Esk Rivers (TEER) catchment area covers 10,000km² (approximately 15 percent of Tasmania, Figure 1). This large catchment drains to the Tamar River estuary transporting pollutants from land surfaces as catchment run-off and from point sources such as industry discharges or Sewage Treatment Plants. In December 2015, NRM North's TEER Program released the Water Quality Improvement Plan (WQIP). This plan provides a comprehensive picture of water quality throughout the Tamar River estuary and its tributaries by identifying the key drivers of water quality issues and the priority actions to address these issues. Catchment sources are the dominant supply of flows and pollutants to the Tamar River estuary. Close to 100% of the contributions of flow and total suspended sediment loads (TSS) can be attributed to catchment sources. For nutrients, approximately 80% of the total nitrogen (TN) and approximately 65% of total phosphorus (TP) are attributed to catchment sources and approximately 85% of the enterococci bacteria.

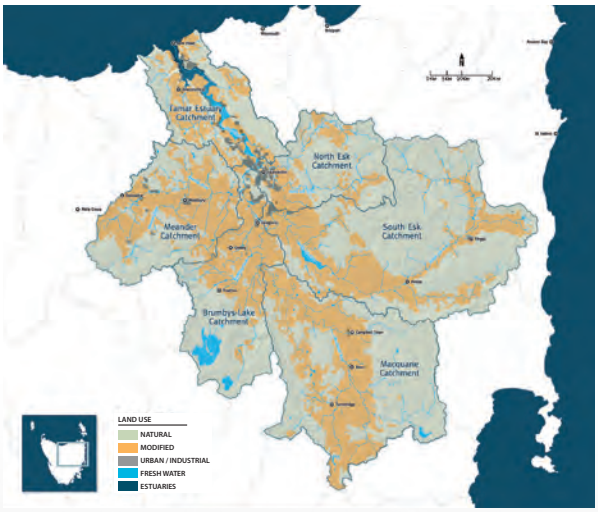


FIGURE 1. TAMAR CATCHMENT MAP

CATCHMENT LOADS OF POLLUTANTS TO THE TAMAR RIVER ESTUARY

Figure 2 shows the contribution of different land uses to average annual catchment pollutant loads and flows. It also shows the proportion of the total catchment area of each land use so that the contribution of each land use can be considered relative to their land area.

Dominant land uses in the TEER catchment by land area are greenspace (~30%), grazing (~36%) and native production forest (~20%) with other land uses covering less than 5% of the total land area each. Land uses which contribute the most flow to the Tamar River estuary are native production forest (~30%), hardwood plantations (~20%) and greenspace (~40%) with smaller but significant contributions from grazing (~2%), softwood plantations and urban areas (both <5%). The dominance of green space, hardwood plantations and native production forests in producing runoff is due to their position in the catchment. These land uses tend to occur in high slope, high rainfall areas at the top of the catchment and so produce high flows relative to their areas. Grazing, dairy and cropping areas tend to be focused on the lower catchment areas, with lower rainfall and slope.

Land cover is a significant factor that contributes to the volume of surface runoff, however slope and rainfall are also important contributing factors. For this reason it is important to compare the relative load contribution of land uses not only to their relative area but also to the flows they produce as this is a major driver of pollutant loads, with higher flows contributing higher pollutant loads all other things being equal.

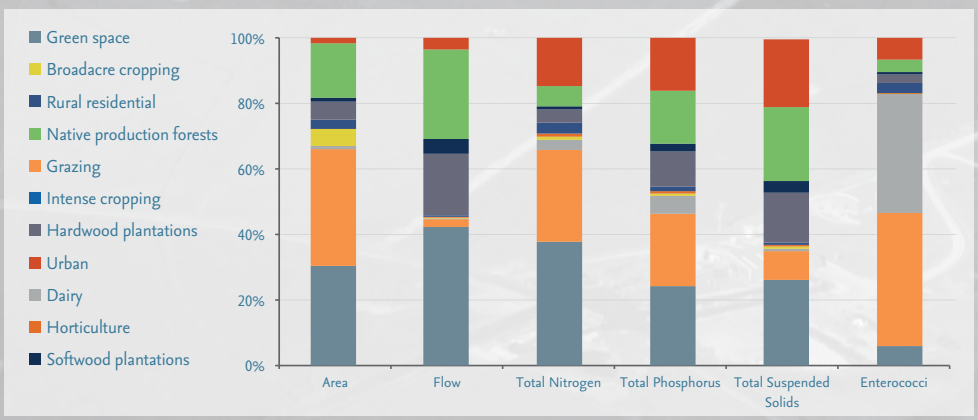


FIGURE 2. ESTIMATED DIFFUSE POLLUTANT LOADS AND FLOW VERSUS LAND USE AREA

NRM North

Tamar Estuary and Esk Rivers

Natural Resource Management in Northern Tasmania

TAMAR ESTUARY WQIP 2018 FACT SHEET

Grazing areas represent approximately 36% of the land area of the catchment but only 2% of the total flows, as they are located in much lower rainfall areas. Despite this small contribution of flow, these areas can represent a significant source of other pollutants, in particular nutrients and enterococci. Dairy farming is a very small land use in the catchment, covering roughly 1% of the land area but is estimated to contribute approximately 3% of the TN, 5.5% of the TP and over 30% of the catchment enterococci load. Urban areas are a very small land use in the catchment, covering only 2% of the land area. Relative to their area, they contribute substantially higher proportions of the total load, ranging from 15% to 21% of nutrient and sediment loads. Cropping areas are a small land use in the catchment (5%) and produce a very small proportion of total loads (approximately 1% of nutrients and sediments).

WQIP ACTIONS AND IMPLEMENTATION

The WQIP explores a range of potential actions to reduce nutrient, sediment and enterococci loads delivered to the Tamar River estuary. Catchment actions explored in grazing, dairy, cropping and urban areas were developed in consultation with stakeholders. Modelled scenarios were used to prioritise actions in each of these landscapes based on both their leverage in reducing pollutant exports and their adoptability on-ground. The potential benefits of upgrades to sewage treatment plants around Launceston were also explored. A set of catchment load and estuary condition targets were developed using feasible adoption of key management actions across the range of catchment and point sources.

NRM North continues to work with partners to invest in implementation of the WQIP through a range of projects to:

- Fence stock out of streams;
- Revegetate riparian zones;
- Improve dairy effluent management;
- Maintain and improve groundcover in grazing and cropping areas;
- Improve fertiliser use;
- Improve irrigation scheduling;
- Implement 'water sensitive urban design' in urban areas; and
- Soil and erosion control on building sites in urban areas.

FOR MORE INFORMATION and to download a copy of the Plan visit:

http://www.nrmnorth.org.au/teer-water-qualityimprovement-plan-2015

FENCING STOCK OUT OF STREAMS

IMPROVING DAIRY EFFLUENT MANAGEMENT

RIPARIAN REVEGETATION

SOIL AND EROSION CONTROL WORKS

FIGURE 3. SOME OF THE WQIP MANAGEMENT ACTIONS BEING IMPLEMENTED BY NRM NORTH

FURTHER INFORMATION

TEER Program
P: (03) 6333 7777
E: admin@nrmnorth.org.au
W: www.nrmnorth.org.au/teer

TAMAR ESTUARY MANAGEMENT TASKFORCE (TEMT)

RIVER HEALTH ACTION PLAN

BACKGROUND

The Tamar Estuary Management Taskforce (the Taskforce) was established in April 2017 under the Launceston City Deal with an aim of identifying investments to improve the health of the Tamar estuary. As part of this work, the Taskforce was charged with delivering a River Health Action Plan by the end of 2017 to:

- Recommend priority government investments and policy actions;
- Include preferred options for mitigating the effect on the Tamar estuary of the combined sewerage and stormwater system;
- Enable long-term oversight of the health of the Tamar estuary and its catchments;
- Identify measurable targets and accountability for meeting them over the life of the City Deal and the longer term;
- Build on the work of the Tamar Estuary and Esk Rivers (TEER) Program led by NRM North, including the 2015 Water Quality Improvement Plan; and
- Deliver annual reports to the Launceston City Deal Executive Board on progress towards targets.

The Taskforce was established with the following membership:

- CEO, Infrastructure Tasmania (Chair)
- City of Launceston
- Northern Midlands Council
- George Town Council
- West Tamar Council
- Meander Valley Council
- Launceston Flood Authority
- NRM North
- Tamar Estuary and Esk Rivers (TEER) Program
- Department of Primary Industries, Parks, Water and Environment

RIVER HEALTH ACTION PLAN

There are many influences cited as reasons for the Tamar not meeting modern expectations of health and amenity including:

- The city's combined sewerage and stormwater system;
- The inability to flush sediment due to marine tides meeting freshwater rivers;
- Agricultural practices further up in the catchment;
- Historical industrial practices;
- Outflows from multiple waste water treatment plants throughout the Tamar River estuary; and
- River floods and man-made changes to the flow and channel of the estuary.

The Taskforce identified the initial priority was to improve public health measures of water quality in the estuary between Launceston to Legana. Two Taskforce working groups were subsequently established - one considering key actions in the estuary's catchments to address pathogens entering the Tamar (the Catchment Action Working Group) and a second looking at options to mitigate untreated overflows from the city's combined sewerage and stormwater system entering the Tamar (the Combined System Overflow Working Group).

The working groups included key stakeholders and technical experts from across industry, agriculture, government and natural resource management to undertake modelling and cost benefit analysis of options. Technical reports were prepared by each working group and submitted to the Taskforce for consideration and to form the basis of the recommendations in the River Health Action Plan.

TAMAR ESTUARY MANAGEMENT TASK FORCE 2018 FACT SHEET

THE KEY RECOMMENDATIONS DETAILED IN THE RIVER HEALTH ACTION PLAN INCLUDED:

1. Catchment actions to the value of $10 million to be implemented across dairy, grazing and urban areas. These actions aim to exclude stock from streams, rehabilitate riparian vegetation buffers on grazing properties, ensure better effluent management on dairy farms and remove sewage intrusion into separated stormwater system in urban areas around Launceston. These actions are expected to reduce pathogen concentrations in the Launceston to Legana zone of the estuary by more than 4 per cent.
2. Priority projects to the value of $84.6 million to be implemented within the combined system. The projects include improved pumping rates and transmission capacity to take greater volumes of combined system flows to Ti Tree Bend sewerage treatment plant, implementing a series of off-line storages to capture the "first flush" of combined system sewage which would otherwise overflow into the estuary and diverting separated sewerage catchments straight to Ti Tree Bend instead of joining the combined system at Margaret Street and the Esplanade. These projects are expected to reduce pathogen concentrations in the Launceston to Legana zone of the estuary by more than 35 per cent.
3. A discussion paper to be prepared by the Department of Primary Industries, Parks, Water and Environment on the regulatory arrangements surrounding the combined system in consultation with relevant stakeholders. The paper would then form the basis of a review to be undertaken by EPA Tasmania on potential changes to the existing regulatory framework to recognise and regulate combined systems consistent with best practice frameworks elsewhere.
4. An increased monitoring and analysis program in the estuary to accompany the proposed actions and investments. This will ensure that progress against the expected improvements can be tracked and reported on and any learnings captured to aid future management decision making or to improve on-ground actions and investments.
5. The Taskforce continues work to determine appropriate ongoing governance arrangements for the estuary and what actions may be taken to improve amenity values associated with sedimentation.

WHERE TO FROM HERE?

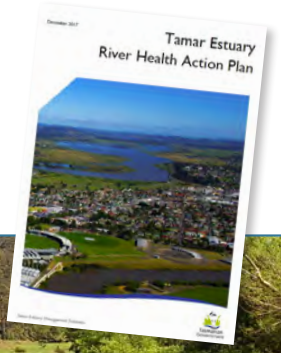
The Tasmanian and Australian governments have jointly committed to funding the recommendations from the River Health Action Plan. A total investment of $95 million will be split in a 50:50 funding arrangement.

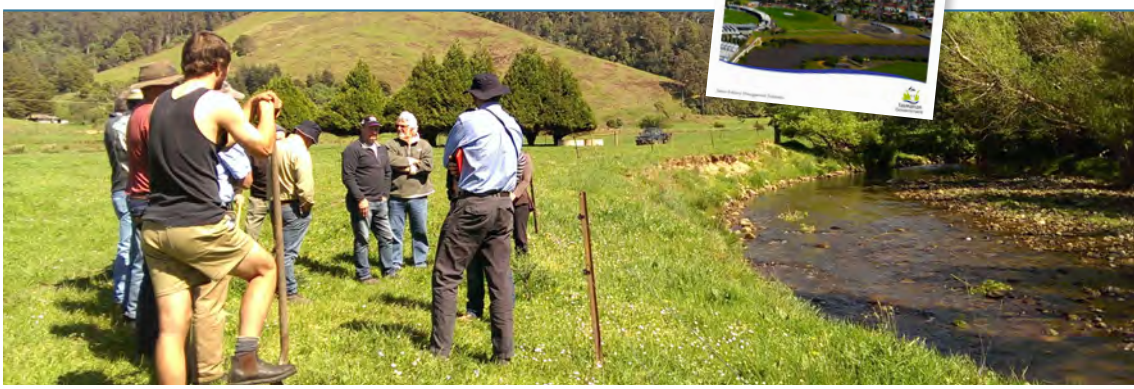
In 2018, the Taskforce will continue to explore governance options for the Tamar and identify the most appropriate model to deliver effective governance and planning and long-term oversight for the health of the Tamar estuary and its catchments. The Taskforce will also explore options that may be taken to improve amenity values associated with sedimentation.

WANT MORE INFORMATION?

A copy of the Tamar Estuary River Health Action Plan is available to download from

https://www.stategrowth.tas.gov.au/infrastructure_tasmania/tamar_estuary_management_taskforce





FURTHER INFORMATION

TEER Program
P: (03) 6333 7777
E: admin@nrmnorth.org.au
W: www.nrmnorth.org.au/teer

NRM North

Tamar Estuary and Esk Rivers

Natural Resource Management in Northern Tasmania

PATHOGEN FACT SHEET

WHAT ARE PATHOGENS?

The term 'pathogen' refers to bacteria, viruses and parasites that have the potential to cause disease. Recreational waters may contain a mixture of faecally derived pathogens. These typically come from human sewage, urban run-off, livestock (eg. sheep and cattle), industrial processes, wildlife, domestic animals and stormwater.

In Tasmania, indicator bacteria in recreational waterways are monitored by local councils during the summer months (December – March). The community is notified through signage when levels exceed the national guidelines. Enterococci are bacteria used as an indicator of faecal contamination which is measured and assessed against national guidelines to determine the public health risk for primary contact recreation (e.g. swimming).

WHERE DO PATHOGENS IN THE TAMAR RIVER ESTUARY COME FROM?

It is estimated that diffuse catchment sources of bacteria account for more than 85% of enterococci loads generated across the greater Tamar catchment drainage area, with combined sewage and stormwater overflows contributing approximately 12%. The impact of loads on concentrations depends on how directly contaminants are delivered to the estuary.

Concentrations of enterococci in zone 1 of the estuary (from Launceston to Legana) frequently exceed limits set by recreational guidelines. Modelling shows the greatest contributor of enterococci concentrations in this zone is from combined sewage and stormwater overflows (50%), with Sewage Treatment Plants (STPs) and diffuse sources accounting for 20% and 30% respectively. For diffuse sources, those originating in the North Esk and Tamar foreshore areas have the greatest impact on zone 1 concentrations.

HOW HAVE PATHOGEN LEVELS CHANGED OVER TIME?

Historical data (mid 1970s) shows extremely high levels of bacteria in the upper estuary. Significant improvements in water quality have occurred in recent times (Figure 1). Data shows that in the 1970s and 1980s, thermotolerant coliforms (indicator of recent faecal contamination) were generally >10 000, peaking into the millions.

From the early 1990s through to 2000s, levels of bacteria were greatly reduced. Improvements in water quality in the upper estuary occurred as a result of improved treatment at STPs, redirection of trade-waste to STPs and upgrades to the combined sewage and stormwater system which reduced overflows from Margaret Street.

Recent levels of bacteria in the Tamar estuary have all been <500 showing a large improvement from years gone by. The last large spikes in bacterial concentrations occurred just before Killafaddy sale yards and abattoir were connected to the Hoblers Bridge STP.

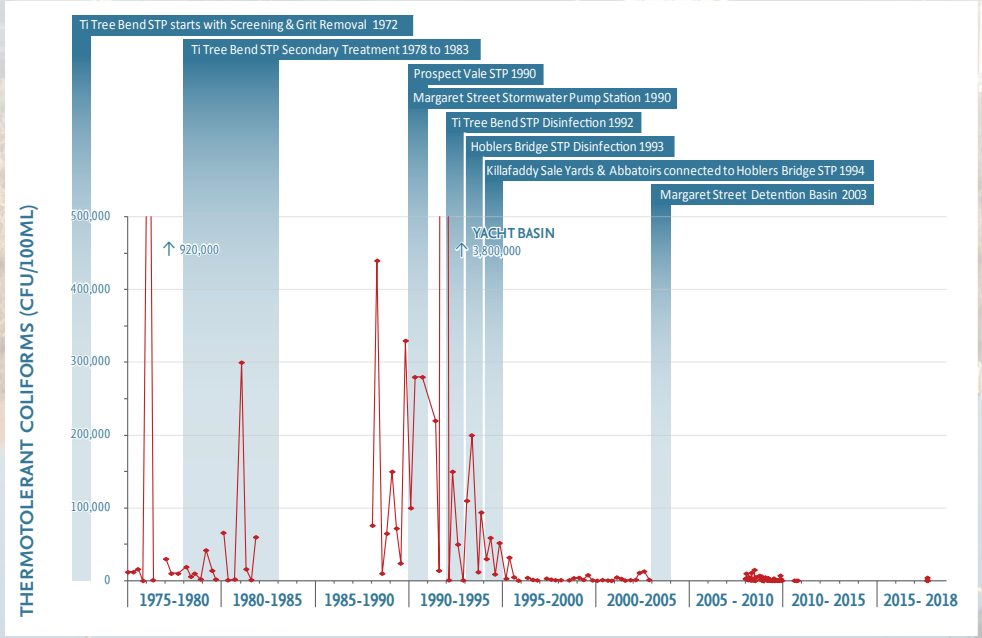


FIGURE 1. HISTORICAL PATHOGEN CONCENTRATIONS IN THE UPPER TAMAR (COLONY FORMING UNITS PER 100ML) (SOURCE: CITY OF LAUNCESTON PROVIDED TO THE TEMT FOR THE RIVER HEALTH ACTION PLAN)

TAMAR ESTUARY PATHOGEN 2018 FACT SHEET

NRM North

Tamar Estuary and Esk Rivers

Natural Resource Management in Northern Tasmania

WHAT IS BEING DONE TO REDUCE PATHOGEN LEVELS?

The TEER Program has been actively working to understand the sources of bacteria in the estuary and to reduce pathogen contamination in waterways. TEER monitors bacteria levels (enterococci) monthly at 16 sites in the Tamar River estuary and uses this data to report on trends in the Tamar Estuary Report Cards.

TEER PROGRAM - FAECAL SOURCE TRACKING

Faecal source tracking is a method of identifying the source of bacteria in a water body through the unique strains of bacteria known to be associated with different human and animal sources. Throughout 2017, water samples were tested for the main contributing sources of bacteria at 10 sites in zones 1, 2 and 3. Levels of bacteria were too low to give an indication of sources beyond mid zone 2. Data showed that the main contributors (20-40%) of the bacteria identified in zones 1 and 2 are livestock (sheep, cattle and horses) and to a lesser extent, humans (sewage treatment plants and septic tanks). The area from Kings Bridge to the ship lift at Kings Wharf tended to be dominated by bacteria from sewage treatment plants (20-30%). This transitions to being dominated by livestock bacteria nearer Riverside, peaking near Legana with livestock dominating at 30-40% of identified bacteria.

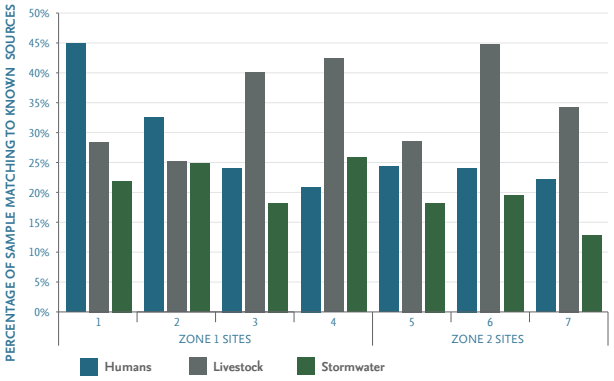


FIGURE 2: THE PERCENTAGE OF BACTERIA IDENTIFIED FROM KNOWN SOURCES: HUMANS (SEPTIC SYSTEMS AND SEWAGE TREATMENT PLANTS), LIVESTOCK (SHEEP, CATTLE AND HORSES) AND STORMWATER IN ZONES 1 AND 2 DURING 2017.

NRM NORTH AND TEER CATCHMENT WORKS PROGRAM

NRM North and TEER continue to invest in the implementation of the TEER Water Quality Improvement Plan (WQIP) and are working with land managers and farmers to adopt best land management practices.

A focus has been working with the dairy industry to manage dairy effluent and restricting stock access to streams on dairy and grazing properties where stock defecate in streams delivering high loads of bacteria. Working with landholders to rehabilitate riparian areas and plant vegetative buffers also provides filtering of overland flow into rivers to reduce bacteria loads.

Activities NRM North has focused on to reduce pathogen levels entering waterways includes projects to:

- Fence stock out of streams;
- Revegetate riparian zones;
- Improve dairy effluent management; and
- Maintain and improve groundcover in grazing and cropping areas.

CITY OF LAUNCESTON - STORMWATER-SEWAGE INTRUSION MONITORING AND MAINTENANCE PROGRAM

As part of its ongoing monitoring and maintenance program, the City of Launceston has conducted 12 months of investigations into pathogen contamination in waterways in the Launceston area. These investigations identified high bacteria levels in a number of urban waterways in the Launceston area.

Following identification of problem areas, council staff prioritised inspections of affected areas to identify the source of pathogen contamination. Kings Meadows Rivulet had high bacteria concentrations even during periods with no rain, indicating a point source contribution of bacterial contaminants. Further investigation identified a number of illegal connections of sewage pipes and direct contributions of animal waste to the stormwater system.

Since resolving these issues, monitoring data from Kings Meadows Rivulet shows a marked improvement in bacteria levels which modelling suggests will have benefits to water quality in zone 1 of the estuary. Figure 3 shows the average concentration of enterococci for days with and without rain, before and after works, to address pathogen contamination. This figure shows that average concentrations for days both with and without rain decreased by more than 70% after works were complete.

This works program is ongoing and can be expected to achieve further reductions in pathogen pollution levels as sources are addressed in other urban waterways.

FURTHER INFORMATION

TEER Program

P: (03) 6333 7777

E: admin@nrmnorth.org.au

W: www.nrmnorth.org.au/teer

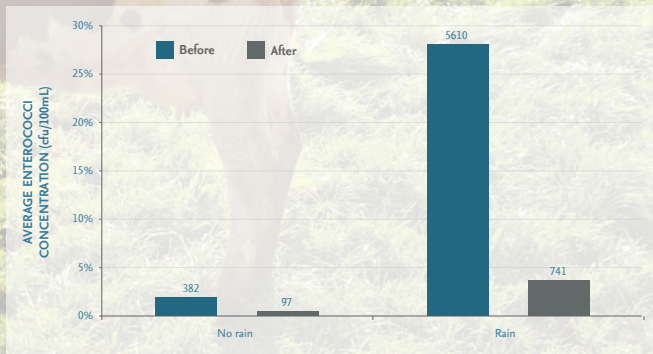


FIGURE 3: AVERAGE ENTEROCOCCI CONCENTRATION (CFU/100ML) FOR DAYS WITH AND WITHOUT RAIN DURING THE PERIOD BEFORE AND AFTER WORKS TO ADDRESS PATHOGEN LEVELS.

TAMAR ESTUARY PATHOGEN 2018 FACT SHEET