NRM North

Tamar Estuary and Esk Rivers

Natural Resource Management in Northern Tasmania

TAMAR ESTUARY 2016 REPORT CARD

ECOSYSTEM HEALTH ASSESSMENT PROGRAM

MONITORING PERIOD DECEMBER 2014 – NOVEMBER 2015

The methodology used in this report has now been superseded.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

TAMAR ESTUARY
2016 REPORT CARD RESULTS

Ecosystem Health Assessment Program study area
Tamar River estuary

The 2016 report card has been produced using 12 months of Tamar River estuary ambient monitoring data from December 2014 to November 2015 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 estuary pressures and the adoption of new locally derived water quality targets for the Tamar 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 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 health and 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 2016 report card results show the influence of low rainfall and a dry year compared to the long term average. Flows through the North and South Esk rivers were consistently low throughout 2015 in comparison to past reporting years. Flows were particularly low during the 2015 winter months of July and August, when traditionally high rainfall events during winter transport higher loads of pollutants to the Tamar River estuary.

This report card shows zones improving in grades, remaining static or declining in grades in comparison to previous years.

Zone 2 remains stable compared to last year and Zones 3, 4, and 5 have improved slightly. The improvement in grades for zones 3, 4 and 5 are likely due to the influence of lower flows through the North and South Esk catchments compared to the previous year and less pollutants delivered to the estuary.

Consistent with past reporting years, Zone 1 received the poorest grades with a slight decline in health compared to the previous year moving from a D+ to a D. This change in grade has been influenced by higher nitrogen levels which may be a result of higher nitrogen inputs from nearby Sewage Treatment Plants (STPs).

The poor health of Zone 1 is due to relatively constant high pollutant loads delivered from the North and South Esk rivers, the Trevallyn Power Station Tailrace and the Sewage Treatment Plants. This is compounded by the influence of the tidal regime which traps pollutants in the upper reaches of the estuary.

A

ZONE 5: MARINE ZONE

Excellent ecosystem health. Overall conditions in this zone meet the water quality targets 91% of the time. Water quality in Zone 5 has improved compared to the previous year, likely due to a dry year with less pollutants delivered to this zone. Zone 5 is marine and is generally quite well flushed resulting in consistently 'good' to 'excellent' grades in past reporting years. The grade in this zone is influenced by slightly elevated levels of phosphorous which meets the target 85% of the time. Turbidity, metals and nitrogen meet targets all of the time. Chlorophyll *a* is elevated only meeting the target 57% of the time.

A–

ZONE 4: MARINE ZONE

Excellent ecosystem health. Overall conditions in this zone meet the water quality targets 85% of the time. Phosphorous is slightly elevated, meeting the target 70% of the time. Water quality has improved in Zone 4 compared to the previous year, likely due to a dry year with less pollutants delivered to this zone. Turbidity and nitrogen meet the targets all of the time. Chlorophyll *a* is elevated only meeting the target 38% of the time. Metal levels meet the target all of the time.

A

ZONE 3: ESTUARINE ZONE

Excellent ecosystem health. Overall conditions in this zone meet the water quality targets 90% of the time. 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 the zone. Elevated nutrient levels are present. Phosphorous only meets the target 9% of the time, whereas nitrogen meets the target 97% of the time. Chlorophyll *a* meets the target 91% of the time. Turbidity meets the target 94% of the time and metal levels meet targets all of the time.

B

ZONE 2: ESTUARINE ZONE

Good ecosystem health. Overall conditions in this zone meet the water quality targets 79% of the time. Elevated nutrient levels are present with phosphorous failing to meet the target all of the time and nitrogen only meeting the target 57% of the time. Nitrogen levels have increased compared to the previous year likely due to the increase in nitrogen loads discharged from STPs. Turbidity remains high only meeting the target 43% of the time and shows an increase from the previous year. Chlorophyll *a* meets the target 60% of the time which is an improvement on the previous year. Metal levels meet the target all of the time.

D

ZONE 1: ESTUARINE ZONE

Poor ecosystem health. Overall conditions in this zone only meet the water quality targets 56% of the time. Poor water quality is due to high nutrient levels, particularly phosphorous which fails to meet the target. High turbidity levels which only meet the water quality target 13% of the time. Chlorophyll *a* only meets the target 28% of the time. Elevated levels of dissolved metals are present particularly aluminium which fails to meet the target all of the time at the two monitoring sites closest to Launceston. Dissolved metals are likely sourced from historic mining sites in the upper catchment, mobilization of sediments within the estuary and urban stormwater runoff. Zone 1 is influenced by significant loads of contaminants delivered directly to the zone from the North and South Esk rivers and discharges from Sewage Treatment Plants, urban stormwater run-off and a twice daily tidal regime where flood tides can be the dominant influence trapping pollutants in this zone.

FIGURE 3. COMBINED MONTHLY AVERAGE FLOWS FROM THE NORTH & SOUTH ESK RIVERS

The Tamar's drainage catchment is approximately 10,000km^2 comprising 15% of Tasmania's land mass.

The major inflows to the Tamar are from the North and South Esk river systems. Figure 3 shows that catchment inflows from the North and South Esk river systems were significantly lower in 2015 compared to 2014, particularly during the summer and winter months.

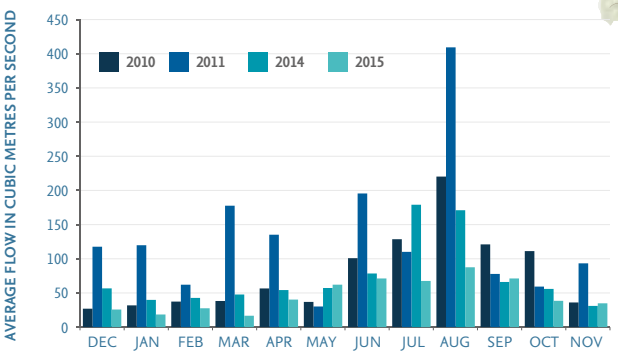
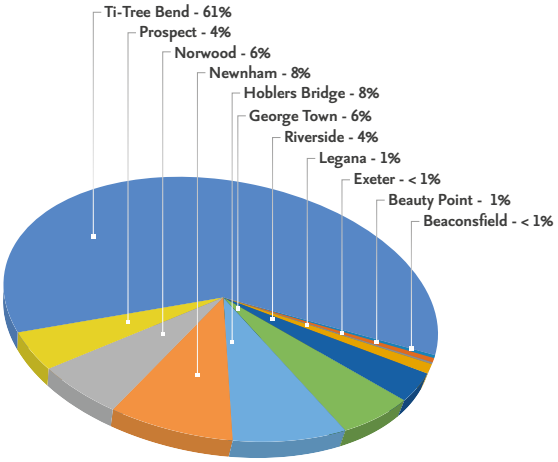


TABLE 1. COMPARISON OF PAST REPORT CARD GRADES

	2011 Report Card (Oct 2009 - Sept 2010 data)	2012 Report Card (Oct 2010 - Sept 2011 data)	2015 Report Card (Dec 2013 - Nov 2014 data)	2016 Report Card (Dec 2014 - Nov 2015 data)
Zone 5	A	B	A-	A
Zone 4	A-	B+	B+	A-
Zone 3	A-	B+	A-	A
Zone 2	B+	C	B	B
Zone 1	C	C-	D+	D

FIGURE 4. PROPORTION OF SEWAGE TREATMENT PLANT DISCHARGE VOLUMES TO THE TAMAR IN 2015 (ML/Yr)



DIRECT PRESSURES ON THE ESTUARY

POLLUTANT LOADS AND TRENDS

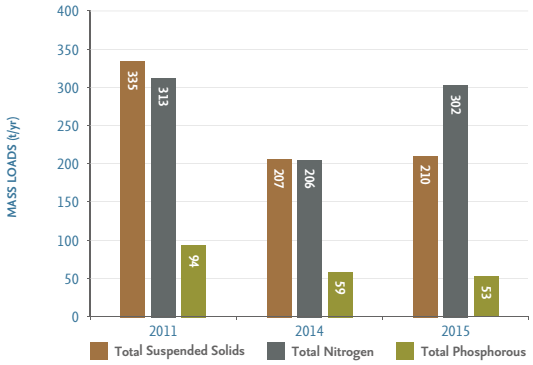
SEWAGE TREATMENT PLANTS

There are eleven Sewage Treatment Plants (STPs) located in close proximity to the Tamar River estuary. Five of the eleven STPs have reuse schemes for effluent disposal. STPs treat domestic sewage and trade waste from surrounding townships and contribute contaminants including organics, toxicants, nutrients and suspended solid loads to the Tamar River estuary. Ti-Tree Bend is the largest STP and treats combined stormwater and sewage from the Launceston area.

Figure 5 shows the nutrient (total nitrogen and total phosphorous) and sediment (total suspended solids) loads discharged to the Tamar River estuary in past reporting years. In 2015, the discharge loads for suspended solids and phosphorous are relatively similar to the loads for 2014. The nitrogen loads however have increased by approximately 30% from 206 t/yr in 2014 to 302 t/yr in 2015. This increase in nitrogen load is likely due to the 18% increase in effluent volume discharged to the Tamar River estuary from STPs compared to 2014. Whilst this increase in discharge would usually result in a similar increase in phosphorous and suspended solid loads, operational changes implemented by TasWater in 2015 to address odour management at the Ti Tree Bend STP may have led to a reduction in these pollutant loads. In 2015, the Ti-Tree Bend STP accounted for 61% of the total STP discharge volume to the Tamar (Figure 4).

TasWater is currently preparing the Launceston Sewerage Improvement Plan (LSIP) which outlines the preferred approach for upgrades to the STPs close to Launceston. The current preferred option for upgrades includes constructing a new northern STP next to the existing Ti-Tree Bend STP. The LSIP proposes to redirect effluent from Legana, Newnham, Riverside, Hoblers Bridge, Norwood and Prospect Vale STPs to the new northern STP. The new northern STP will have significant nutrient removal capability and it is estimated that nutrient load reductions will be approximately 50% for nitrogen and phosphorous and up to 80% for ammonia.

FIGURE 5. ESTIMATED AVERAGE ANNUAL LOADS FROM SEWAGE TREATMENT PLANTS DISCHARGING TO THE TAMAR



STORMWATER

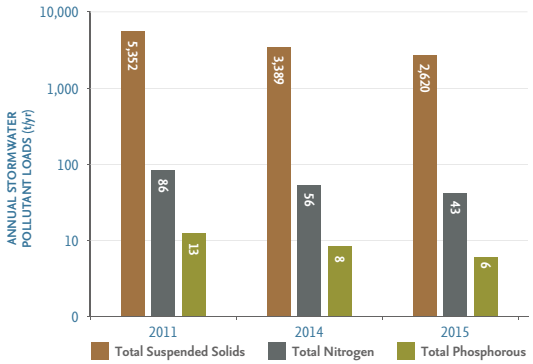
Urban stormwater is primarily rainfall that runs off impervious areas such as roofs, roads, footpaths and car parks and enters drainage networks before being transported to waterways. The stormwater data presented in this report card represents stormwater discharging directly from urban areas surrounding 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.

Stormwater contributes a high load of sediment 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.

Figure 6 shows the influence of the dry year in 2015. Stormwater pollutant loads correlate to intensity and duration of rainfall, less rainfall leads to decreasing loads. Below average rainfall in 2015 has resulted in less run-off from urban and rural land areas and consequently less pollutant loads entering the estuary in comparison to 2014 and 2011.

Stormwater is a source of sediment input to the Tamar River estuary and to a lesser extent nutrients. Past stormwater monitoring programs have identified that stormwater is also a source of metals to the estuary, however a lack of long term continuous data means that it is not possible to present these trends.

FIGURE 6. ESTIMATED ANNUAL STORMWATER LOADS TO THE TAMAR



SILT RAKING

Silt raking refers to the activity of agitating sediments on the bed and the banks of the upper Tamar River estuary using a converted scallop dredge. The aim of the activity is to mobilise sediments and allow higher river flows to remove sediments from the upper estuary to improve recreational amenity, aesthetics and navigational access.

Silt raking generally occurs during the winter months on an outgoing tide when higher flows from the North and South Esk rivers can carry sediments downstream. In 2013, the Launceston Flood Authority (LFA) was granted a five year permit to undertake silt raking activities in the Tamar River estuary.

This report card incorporates data collected during silt raking activities in 2014 and 2015. The Suspended Sediment graph (Figure 7) shows sediment trends from June to October in the Tamar for 2010, 2011, 2014 and 2015.

The volume of sediment raked in 2015 was 25,500m^3 compared to 101,014m^3 in 2014. The LFA reported that the absence of high flows, particularly during July and August, limited silt raking activities in 2015. The Flow graph (Figure 8) shows that 2015 experienced approximately half the volume of flows between June and October compared to 2014.

The high total suspended sediments results for zone 1, particularly at sites 2 and 3 for 2015 indicate that sediment from silt raking remains trapped in Zone 1 due to the lack of 'flushing' flows and the dominance of flood tides is a factor contributing to the poor water quality in Zone 1.

In 2015, the LFA commissioned a sediment tracing investigation which identified that sediment removal from silt raking is not effective in the absence of high river flows.

The LFA is required to monitor water quality during the raking campaigns. To date, nutrient and metal results suggest that silt raking would have minimal impact on water quality. Additional data will be required before any long term trends for water quality or ecological impacts from silt raking activities can be concluded.

FIGURE 7. TAMAR SUSPENDED SEDIMENT TRENDS FROM JUNE-OCTOBER

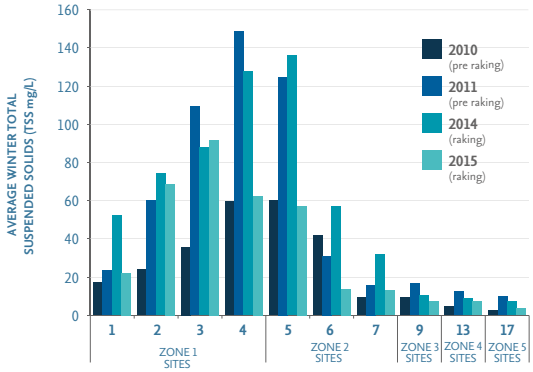


FIGURE 8. FLOW TO THE TAMAR FROM THE NORTH & SOUTH ESK RIVERS

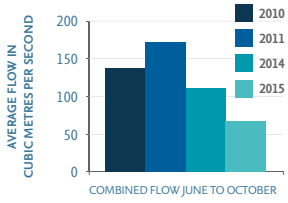


TABLE 2. SEDIMENT VOLUMES RAKED PER YEAR CUBIC METRES (m^3)

2012	22,500 m^3
2013	200,000 m^3
2014	101,014 m^3
2015	25,500 m^3

Vision for the Tamar Estuary
AND ESK RIVERS SYSTEMS 2030

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

KEY MESSAGES

- This report card shows an overall improvement in ecosystem health of the Tamar River estuary in comparison to the 2015 grades with the exception of zone 1. This overall improvement has been driven by climatic conditions with low rainfall and flows resulting in less pollutants delivered to the estuary from catchment run-off.
- Zone 1 between Launceston and Legana has declined in health in comparison to previous reporting years. This is likely due to the lack of flushing flows combined with higher loads of nutrient inputs from surrounding sewage treatment plants in particular the Ti Tree Bend Sewage Treatment Plant.
- Zone 1 continues to perform poorly even during low flow years when less pollutants are delivered to the estuary from diffuse sources. This is likely due to the influence of the tidal regime which traps pollutants in Zone 1.
- Nutrient levels remain elevated throughout the Tamar River estuary and are a concern for the health of the system. The major sources of nutrients to the estuary include catchment run-off from agricultural areas, Sewage Treatment Plants and industry inputs.
- Metal levels are generally low throughout the estuary with the exception of Zone 1 which has high levels of Aluminium. Sources of metals in Zone 1 are most likely attributed to urban stormwater run-off and historic mining sites in the upper catchments.
- The recreational amenity of the Tamar River estuary has improved compared to previous reporting years. This is likely due to a drier year and consequently less bacteria delivered to the system from the catchments and less sewer overflows from Launceston's combined sewerage and stormwater system.

RECREATIONAL MESSAGES

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

Avoid swimming in the Tamar 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 estuary are limited to 2-3 serves per week.

WHERE DO POLLUTANTS COME FROM?

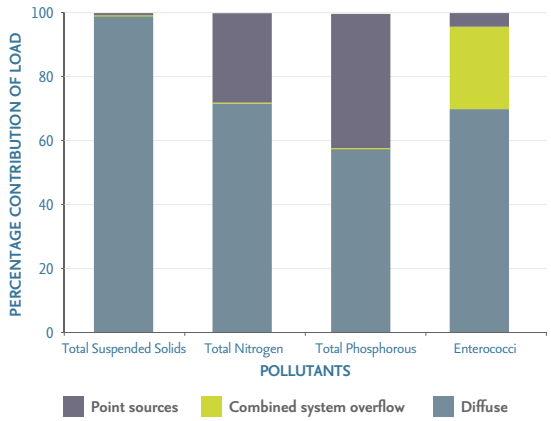
The Tamar River estuary's catchment drainage area in north east and central Tasmania is approximately 10,000 km^2 representing 15% of the landmass and comprises a mix of land uses including urban, agricultural, forestry and natural conservation areas. Diffuse and point sources of pollutants to the Tamar River estuary place pressure on the health of the aquatic ecosystem and its use for recreational and agricultural purposes. At high enough concentrations, pollutants such as suspended solids and nutrients can lead to water quality decline and impact on ecological health. Diffuse sources are loads of pollutants that originate as run-off from land surfaces in the catchment. Point sources are pollutants discharged from single sources, primarily from industry and Sewage Treatment Plants (STP).

Diffuse pollutant loads account for the greatest percentage of loads delivered to the Tamar River estuary contributing approximately 72% of the nitrogen, 57% of the phosphorous, 99% of the suspended solids and 70% of the enterococci (a faecal indicator bacteria).

Point source pollutant loads from STPs and industry account for approximately 28% of the total nitrogen, 42% of the total phosphorous, 1% of the total suspended solids (sediments) and 4% of the enterococci bacteria delivered to the Tamar River estuary.

A further contribution of pathogens to the estuary arises from Combined System Overflows (CSOs). The CSOs are attributed to overflows from Launceston's combined sewerage and stormwater system which is designed to discharge excess flows beyond the capacity of the system's pipes and pump stations into the estuary during high rainfall events. Outside of these events both sewage and storm water in this combined system is treated.

FIGURE 1. ESTIMATED LONG TERM AVERAGE ANNUAL CONTRIBUTIONS OF DIFFUSE AND POINT SOURCE LOADS TO THE TAMAR



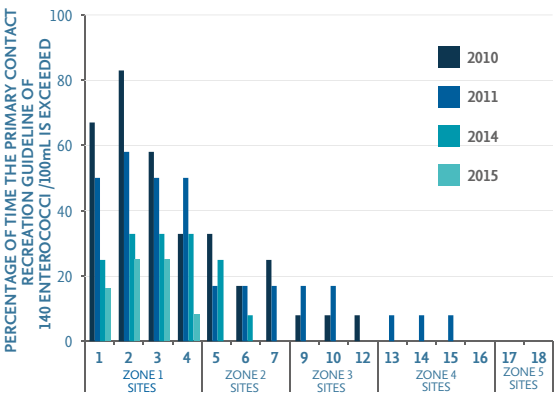
RECREATIONAL AMENITY

The Tamar River estuary is widely used for a range of recreational pursuits including sailing, rowing, fishing, swimming, kayaking and walking. High levels of bacteria can result in 'public health advisories' for popular recreational sites and limit recreational amenity due to public health risks. Enterococci is a bacteria used as an indicator of faecal contamination and is measured and assessed against guidelines to indicate trends over time for the recreational amenity of the Tamar. In Tasmania in accordance with the Recreational Water Quality Guidelines 2007, a limit of 140 enterococci per 100mm of water is used for assessing the public health risk for primary contact recreation (e.g. swimming). When a routine recreational water sample exceeds 140 enterococci/100mL the controlling authority (council) resamples the water body and conducts an appropriate sanitary survey of the area. Where two consecutive water sample results are greater than 280 enterococci/100mL the controlling authority is to advise the public that water quality is unsuitable for primary contact.

The results for recreational amenity in the Tamar River estuary show an improvement in 2015 in comparison to previous reporting years. This is primarily due to below average rainfall leading to less catchment run-off and enterococci loads in the catchments transported to the estuary and less overflows from Launceston's combined sewerage and stormwater system.

Zone 1 is the only zone to exceed guidelines in 2015. Zone 1 is not recommended for primary contact activities and permanent 'do not swim' signs have been erected by the City of Launceston to inform the public.

FIGURE 2. PRIMARY CONTACT RECREATIONAL AMENITY TRENDS IN THE TAMAR



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 the determination of a single grade for each zone. The Ecosystem Health Index (EHI) is a numerical representation of how often the indicators meet the water quality targets.

A **EXCELLENT** (EHI: 0.86 – 1.00)
- conditions meet the water quality targets more than 86% of the time;

B **GOOD** (EHI: 0.70 – 0.85)
- conditions meet the water quality targets 70 to 85% of the time;

C **FAIR** (EHI: 0.60 – 0.69)
- conditions meet the water quality targets 60 to 69% of the time;

D **POOR** (EHI: 0.50 – 0.59)
- conditions only meet the water quality targets 50 to 59% of the time;

F **FAIL** (EHI: <0.50)
- conditions fail to meet the water quality targets 50% of the time;

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

REPORT CARD

The 2016 report card uses an easy to understand grading system of 'A' through to 'F' for five zones within the estuary. The grades represent the overall health of the Tamar River estuary from 16 monitoring sites using data collected from December 2014 to November 2015 capturing all seasons.

Report card web pages have been produced to complement this report card, providing more detail on the data and methods used.

The web pages can be accessed through the TEER website www.nrmnorth.org.au/teer

TAMAR ESTUARY AND ESK RIVERS (TEER) PROGRAM

The Tamar Estuary and Esk Rivers (TEER) Program was established in 2008 and is a regional partnership between the agencies responsible for management of the Tamar Estuary and Esk Rivers waterways. 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.

A current major initiative of the TEER Program is the development of the Water Quality Improvement Plan (WQIP) for the TEER waterways. The WQIP is a blueprint for improving water quality under current and future land use scenarios throughout the catchment. 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. The EHAP operates on a four year cycle including two years of monitoring and production of annual report cards followed by two years off to focus on discrete projects to investigate issues impacting on the waterways.

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, Van Diemen Aquaculture, BCD Resources, South 32, Launceston Flood Authority, University of Tasmania and Australian Maritime College.

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 waterway health. The Ecosystem Health Assessment Program (EHAP) is used to evaluate the effectiveness of future activities undertaken to improve waterway health such as Sewage Treatment Plant upgrades, stormwater controls and catchment activities applying accepted modern technology and best practice environmental management.

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 to 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.

NRM North

Tamar Estuary and Esk Rivers

Natural Resource Management in Northern Tasmania

FURTHER INFORMATION

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Cover photo courtesy Matthew Butt
Old Wife, Enoplosus armatus

PROGRAM PARTNERS

NRM North · Australian Government · National Landcare Programme · Tasmania Explore the possibilities · University of Tasmania · AMC Australian Maritime College · TasWater · EPA Tasmania Environment Protection Authority · Launceston Flood Authority · Hydro Tasmania The power of natural thinking · Meander Valley Council · City of Launceston · Northern Midlands Council · West Tamar Council · Tasmania Mine · Van Diemen Aquaculture · Bell Bay Aluminium Pacific Aluminium · South32

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