



Tamar Estuary  
and Esk Rivers

Natural Resource Management  
in Northern Tasmania

# TAMAR ESTUARY 2015 REPORT CARD

ECOSYSTEM HEALTH ASSESSMENT PROGRAM

MONITORING PERIOD DECEMBER 2013 – NOVEMBER 2014

**The methodology used in this report has now been superseded.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’

Australian Fur Seal, *Arctocephalus pusillus*  
Tamar River kanamaluka

# TAMAR ESTUARY

## 2015 REPORT CARD RESULTS



Ecosystem Health Assessment  
Program study area  
Tamar River estuary Tasmania

## SUMMARY

The 2015 report card results show the influence of a relatively dry year in 2014 compared to the long term average. During the spring and summer months rainfall was generally half the long term average. This contributed to lower flows through the North and South Esk rivers.

This report card shows some zones improving in grades and other zones declining in grades in comparison to previous years.

Zones 2 and 3 show an improvement in grades compared to previous reporting years primarily due to a drier year in 2014 and less pollutants delivered to the estuary from the catchments, sewage treatment plants, and stormwater run-off.

Grades for Zones 4 and 5 reflect the greater influence of local pressures and loads from the estuary foreshore catchments in the absence of high flows transporting pollutants from the North and South Esk rivers.

Consistent with past reporting years, Zone 1 continues to receive the poorest grades in comparison to other zones in the estuary. Zone 1 receives relatively constant high pollutant loads due to high inflows delivered from the North and South Esk Rivers, the Trevallyn Power Station Tailrace, and the Ti-Tree Bend Sewage Treatment Plant. This is compounded by the influence of the tidal regime which traps pollutants in the upper reaches of the estuary.

The 2015 report card has been produced using 12 months of Tamar River estuary ambient monitoring data from December 2013 to November 2014 at 16 sites along the length of the estuary.

In 2014 a major review of the report card was undertaken. The key recommendations from the review have been incorporated into this report card and include pollutant loads and trends for the direct pressures on the Tamar River estuary and the adoption of new local water quality targets for the Tamar to replace the default Australian and New Zealand Environment Conservation Council (ANZECC) guidelines used in previous report cards. This approach has been adopted to provide more information to the community to interpret the grades and trends in estuary health. The adoption of locally derived water quality targets represents best practice replacing less specific default guidelines. Past grades have been re-calculated using the new local targets. Further information on the methods and results for the 2015 report card can be found on the TEER website.

### B<sup>+</sup>

#### ZONE 5: MARINE ZONE

Good ecosystem health. Overall conditions in this zone meet the water quality targets 81% of the time. This zone is classified as marine and is generally quite well mixed and 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 87% of the time. Turbidity, metals, *chlorophyll a* and nitrogen meet targets all of the time.

### B<sup>-</sup>

#### ZONE 4: MARINE ZONE

Good ecosystem health. Overall conditions in this zone meet the water quality targets 70% of the time. Nutrient and turbidity levels in this zone are only slightly elevated with phosphorous meeting the target 99% of the time, nitrogen meeting the target 91% of the time and turbidity meeting the target 96% of the time. *Chlorophyll a* only meets the target 37% of the time. Metal levels meet the target all of the time. Zone 4 has declined slightly in grade compared to previous reporting years. This is likely due to the influence of local catchment inflows from West Arm and Middle Arm. Zone 4 is the second most urbanised and industrialised zone in the estuary.

### A<sup>-</sup>

#### ZONE 3: ESTUARINE ZONE

Excellent ecosystem health. Overall conditions in this zone meet the water quality targets 86% 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 fails to meet the target all of the time however nitrogen still meets the target 80% of the time. *Chlorophyll a* meets the target 97% of the time. Turbidity 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 77% of the time. Water quality has improved compared to the 2012 report card rating of D+ which is likely due to a drier year and less pollutants transported from Zone 1 into Zone 2. Elevated nutrient levels are present with phosphorous failing to meet the target all of the time and nitrogen meeting the target 52% of the time. *Chlorophyll a* only meets the target 40% of the time. Turbidity remains high only meeting the target 35% of the time. 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 54% of the time. Poor water quality is due to high nutrient levels and turbidity which meet the water quality targets less than 5% of the time. *Chlorophyll a* only meets the target 30% of the time. Elevated levels of dissolved metals are present particularly aluminum and copper which are likely sourced from historic mining sites in the upper catchment and urban stormwater runoff. Zone 1 is influenced by high 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 which traps pollutants in this zone.

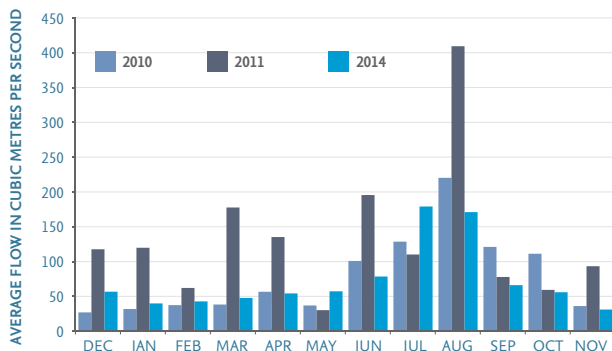




#### COMBINED MONTHLY AVERAGE FLOWS FROM THE NORTH & SOUTH ESK RIVERS

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

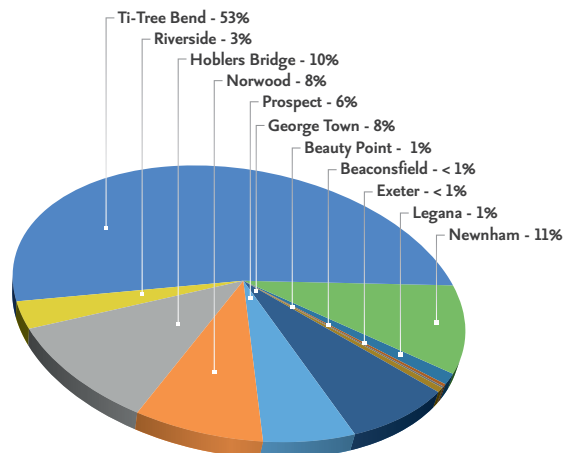
The major inflows to the Tamar are from the North and South Esk River systems. This graph shows that catchment inflows from the North and South Esk river systems were significantly lower in 2014 compared to the last monitoring year in 2011.



#### 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)
<b>ZONE 5</b>	A	B	B <sup>+</sup>
<b>ZONE 4</b>	A <sup>-</sup>	B	B <sup>-</sup>
<b>ZONE 3</b>	B	B	A <sup>-</sup>
<b>ZONE 2</b>	B <sup>-</sup>	D <sup>+</sup>	B
<b>ZONE 1</b>	C	D <sup>+</sup>	D

#### PROPORTION OF SEWAGE TREATMENT PLANT DISCHARGE VOLUMES TO THE TAMAR IN 2014 (ML/YR)



# DIRECT PRESSURES ON THE TAMAR

## POLLUTANT LOADS AND TRENDS

### SEWAGE TREATMENT PLANTS

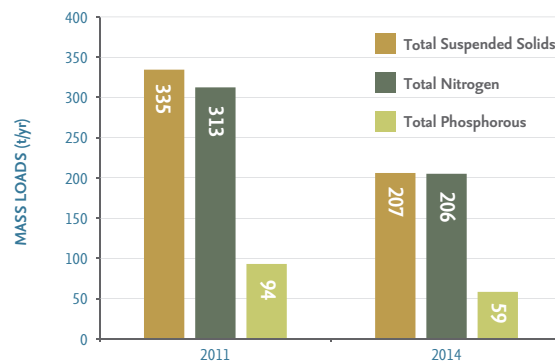
There are eleven sewage treatment plants (STPs) located in close proximity to the Tamar River estuary. Five of the eleven STPs have reuse schemes for effluent disposal. Ti-Tree Bend is the largest STP and treats combined stormwater and sewage from the Launceston area contributing over 50% of the STP discharges to the estuary. STPs collect and treat sewage and trade waste from surrounding townships and contribute nutrients and suspended solid loads to the Tamar River estuary, with loads increasing during high flow periods.

The STP graph (right) shows the nutrient (total nitrogen and total phosphorous) and sediment (total suspended solids) loads discharged to the Tamar River estuary in 2011 and 2014. A decrease in nutrient and sediment loading is observed, with an approximate reduction of

107 t/yr of nitrogen, 35 t/yr of phosphorous, and 128 t/yr of sediments in 2014 compared to 2011. This reduction is largely due to a decrease in discharge from the STPs caused by a drier year in 2014 compared with 2011. Discharge decreased from 16,771 ML/yr in 2011 to 9,833 ML/yr in 2014. A decrease in loads is also attributed to a number of operational changes undertaken by TasWater including a higher level of reuse achieved at the Riverside STP and a reduction in trade waste loading to the Norwood STP.

Other key initiatives in progress by TasWater include the development of the Launceston Sewerage Improvement Plan and a long term strategy for addressing the Combined System Overflows to the Tamar.

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 with the exception of stormwater from the combined stormwater and sewerage system from Launceston which enters the Ti-Tree Bend Sewage Treatment Plant.

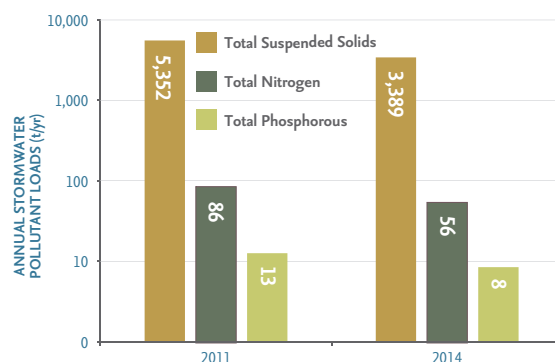
Stormwater contributes a high load of sediment to the Tamar River estuary. The sediment load from urban stormwater represents approximately 8% of the total load of sediments delivered to the estuary from less than 1% of the catchment area.

The Stormwater graph (right) shows the influence of the dry year in 2014. This resulted in less run-off from urban land areas and consequently less pollutant loads entering the estuary in comparison to 2011.

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

The Tamar Estuary and Esk Rivers (TEER) Program coordinates the Northern Tasmanian Stormwater Program (NTSP). This program brings together local government and TasWater to progress regional stormwater projects. A key focus of the program is to encourage the adoption of best practice soil and erosion control on building sites and incorporating Water Sensitive Urban Design (WSUD) into urban areas. WSUD aims to cleanse and reuse as much stormwater as possible before and after it flows down drains, to filter out pollutants and reduce the peak flow following rainfall events. More information on the NTSP projects delivered with our partners can be found on the TEER website [www.nrmnorth.org.au/stormwater-program](http://www.nrmnorth.org.au/stormwater-program).

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 winter flows to remove sediments from the upper estuary to improve recreational amenity, aesthetics and navigational access.

Silt raking 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 during the winter silt raking activities in 2014. The Suspended Sediment graph (right) shows sediment trends from June to October in the Tamar for 2010, 2011 and 2014. This data indicates high total suspended sediments during the 2014 silt raking campaign were present. Generally, trends in total suspended sediments would be expected to increase with increases in flows as demonstrated in the pre-raking, higher flow period in 2011.

The Flow graph (right) shows that 2014 experienced lower flows between June and October in comparison to 2010 and 2011, however high levels of suspended sediments were present in zones 1 and 2 as indicated in the Suspended Sediment graph. This result may indicate that silt raking is having an impact on water quality in Zones 1 and 2, similar to levels observed during wet high flow years.

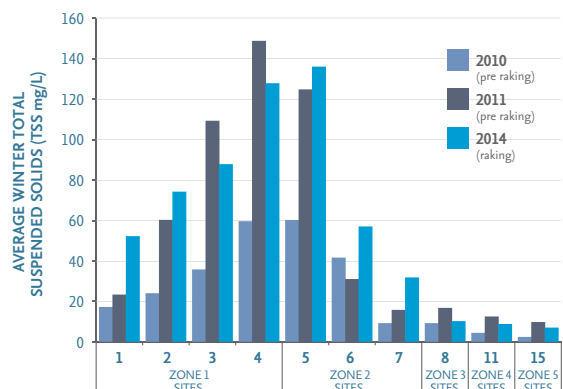
Results in the Suspended Sediment graph indicate that the tidal influence during the 2014 dry year kept sediments trapped in Zones 1 and 2, in comparison to the 2011 pre-raking wet year when higher loads of sediments were carried downstream to zones 3, 4 and 5 on flood flows.

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

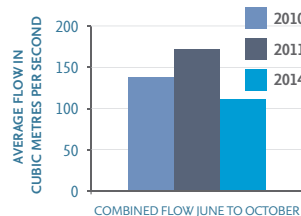
The LFA is required to monitor water quality during the raking campaigns. To date results have remained within the Environment Protection Authority's requirements. The LFA has also been tasked with the delivery of the \$3 million Australian Government investment into the Tamar River Recovery Plan from 2013 to 2017. Key activities funded under this initiative include:

- the silt raking program and a sediment tracing study to understand sediment transport in the estuary,
- a partnership with NRM North to deliver catchment management works to reduce pollutants entering rivers, and
- a partnership with TasWater to identify short and long term strategies for reducing sewage overflows entering the Tamar.

TAMAR SUSPENDED SEDIMENT TRENDS FROM JUNE TO OCTOBER



FLOW TO THE TAMAR FROM THE NORTH & SOUTH ESK RIVERS



SEDIMENT VOLUMES RAKED PER YEAR CUBIC METRES (m³)

2012	22,500 m³
2013	200,000 m³
2014	101,014 m³



# 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 a slight improvement in the ecosystem health of the Tamar River estuary in comparison to the 2012 grades. This is largely due to a relatively dry monitoring year in 2014 and less pollutants delivered to the estuary.
- Zone 1 continues to perform poorly even during low flow years when less pollutants are delivered to the estuary from diffuse and point sources. This is likely due to the influence of the tidal regime which traps pollutants in Zone 1.
- Nutrient levels are elevated throughout the Tamar River estuary and are a key 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. 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 River estuary



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?

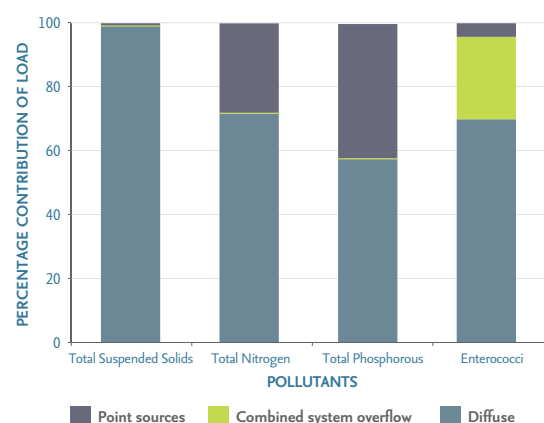
The Tamar River estuary's drainage area is approximately 10,000 km<sup>2</sup> representing 15% of Tasmania and is comprised of a mix of land uses including urban, agricultural, forestry and natural conservation areas. Diffuse and point source pollutant loads to the Tamar River estuary place pressure on the health of the aquatic ecosystem. At high enough concentrations, pollutants such as sediments and nutrients can lead to water quality decline and impair the ecological health of the estuary. Diffuse sources are loads of pollutants that originate as run-off from land surfaces in the catchment. Point sources are pollutant loads delivered to the estuary, primarily from industry or sewage treatment plant (STP) discharges.

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

Point source 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.

AVERAGE ANNUAL CONTRIBUTIONS OF DIFFUSE AND POINT SOURCE LOADS TO THE TAMAR



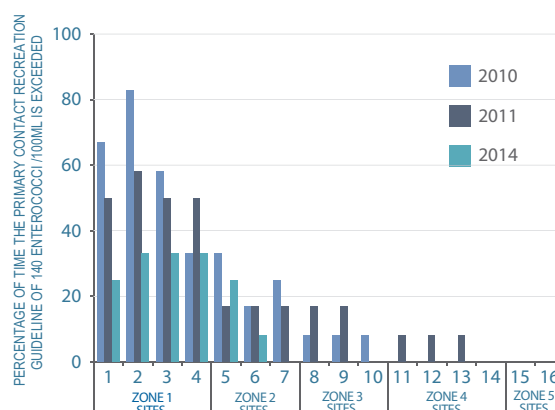
## RECREATIONAL AMENITY

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 used as an indicator of faecal contamination which 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 1997, a limit of 140 enterococci per 100 millilitres of water is used for assessing the public health risk for primary contact recreation (e.g. swimming).

The results for recreational amenity in the Tamar River estuary show an improvement in 2014 in comparison to previous reporting years. This is primarily due to the dry year experienced in 2014, leading to less catchment run-off and enterococci loads from livestock in the catchments transported to the estuary and less combined system overflows from Launceston's combined sewerage and stormwater system.

Zone 1 exceeds the guidelines more than 25% of the time each year primarily from May through to July. 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.

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 2015 report card uses an easy to understand grading system of 'A' through '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 2013 to November 2014.

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](http://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 our scientific understanding of the issues impacting upon the health of the TEER waterways so that we can better identify and target priority areas requiring investment in on-ground works.

A current major initiative of the TEER program is the development of a Water Quality Improvement Plan (WQIP) for the TEER waterways. The WQIP will be 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.

## 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 the Tasmanian Government, NRM North, City of Launceston, West Tamar Council, George Town Council, Meander Valley Council, Northern Midlands Council, University of Tasmania, Hydro Tasmania, TasWater, BCD Resources, South32, Bell Bay Aluminium, Van Diemen Aquaculture, Launceston Flood Authority, Environment Protection Authority 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) will also enable managers to better evaluate the effectiveness of future activities undertaken to improve waterway health such as sewage treatment plant upgrades, stormwater controls, and catchment activities.

## 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 defined 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 difficult to measure, there are more easily measured parameters that are used to infer ecological health which have been used in the EHAP. These parameters include water quality and biological indicators.



Tamar Estuary and Esk Rivers

Natural Resource Management in Northern Tasmania

### FURTHER INFORMATION

#### TEER Program

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### PROGRAM PARTNERS

