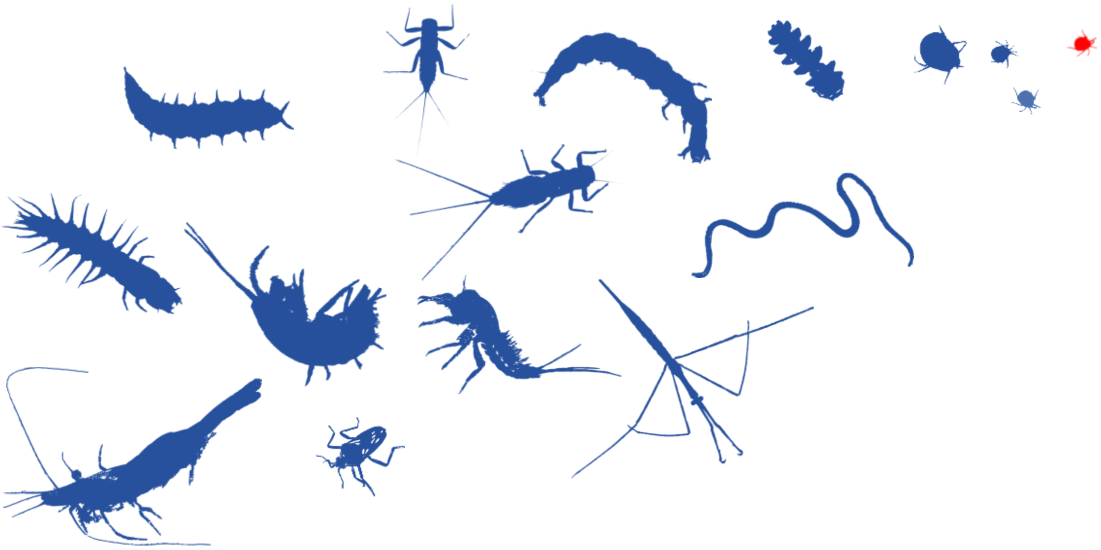

Tributaries of the Derwent Estuary - Waterbug survey

Spring 2024

NATIONAL Waterbug Blitz

Contents

Cover photos are (left to right):

- Lower left - Faulkner Rivulet upstream of Boondar Street
- Middle - Vincents Rivulet off Proctors Road
- Top left - Humphreys Rivulet at Grove Road.

Prepared for: **Derwent Estuary Program Ltd**

by The Waterbug Company Pty Ltd

Using data from: The National Waterbug Blitz

Versioning:

Version	submitted	Received by	acknowledged
V1.0	23/06/2025	Phillip Pennisi	
V2.0	27/06/	Phillip Pennisi	

Summary

Fifty-six sites were sampled across tributaries of the Derwent Estuary and its tributaries in Spring and early Summer 2024. Samples assessed the ecological health of the waterway at each site using waterbugs. These were identified using The Waterbug App and submitted for analysis on The National Waterbug Blitz website and database. Results can be found online here: https://www.waterbugblitz.org.au/data_portal.php?state=tas

The diversity of waterbugs at particular points along a waterway can tell us much about that waterway's long-term exposure to impacts such as pollution or sedimentation. The presence of more sensitive waterbugs indicates lesser impacts, whereas sites populated only by "tolerant" organisms suggest impacted waters. Tolerant waterbugs are those that have resilience to pollution, sediment and other impacts.

Many of the upstream waterways assessed for this work were in good condition; the upper sections of rivulets with sources on Mount Wellington/kunanyi are all healthy. Waterway health generally declined downstream as land use in the surrounding catchment intensified.

Many sites at the lower end of the rivulets scored poorly and this was attributable to localised impacts, urbanisation, all possibly exacerbated in the ephemeral waterways that were sampled. These are discussed site by site in the following report.

Acknowledgement

This project was commissioned by the Derwent Estuary Program as part of their stormwater monitoring project funded through the Australian Government's Urban Rivers and Catchments Program.

This work draws heavily on samples taken for the City of Hobart "State of the Rivulets" sampling program (run by Daniel Rhodes). It also uses additional samples funded by Kingborough Council and Glenorchy City Council.

Introduction

This study uses the presence and diversity of waterbugs to provide assessments of ecological health for Derwent Estuary tributaries and its tributaries. Fifty-six samples were collected in Spring 2024.

Waterbugs provide insight into the longer-term effects of water quality on the health of a freshwater ecosystem. Waterbugs break down and feed on organic matter and each other. They are important food for larger animals in the food chain, such as native freshwater fish and the much-loved platypus.

The diversity of waterbugs at particular points along a waterway can tell us much about that waterway's long-term exposure to impacts such as pollution or sedimentation. The presence of more sensitive waterbugs indicates lesser impacts, whereas sites populated only by "tolerant" organisms suggest impacted waters. Tolerant waterbugs are those that have resilience to pollution, sediment and other impacts.

Many of the upper reaches of Derwent Estuary tributaries are good reference sites for what healthy local waterways should look like in terms of stream biodiversity and water quality when pollution is low to non-existent. These upper reaches also act as a "biodiversity bank" by allowing sensitive waterbugs such as stoneflies and mayflies to migrate downstream when conditions allow.

Waterbug sampling for this report was done using the methodologies developed for the National Waterbug Blitz. This technique samples waterbugs from instream habitats, then identifies them in the field using The Waterbug App. These lists of identified invertebrates are then converted into an assessment of ecological health (SIGNALT – see Appendix 1 for detail), allowing different sites to be compared numerically using known relationships between the waterbugs sampled and their tolerance (or otherwise) of riverine pollution. Data can be viewed at the waterbugblitz.org.au website, where it is mapped alongside other assessments from across Australia.

The Sites

Sites were selected along the length of each river to best detect patterns of ecological health/condition change in the Derwent Estuary tributaries.

Figures 1and 2 show the location of these sites.

Table 1 lists these sites with further information about locality and sample date.

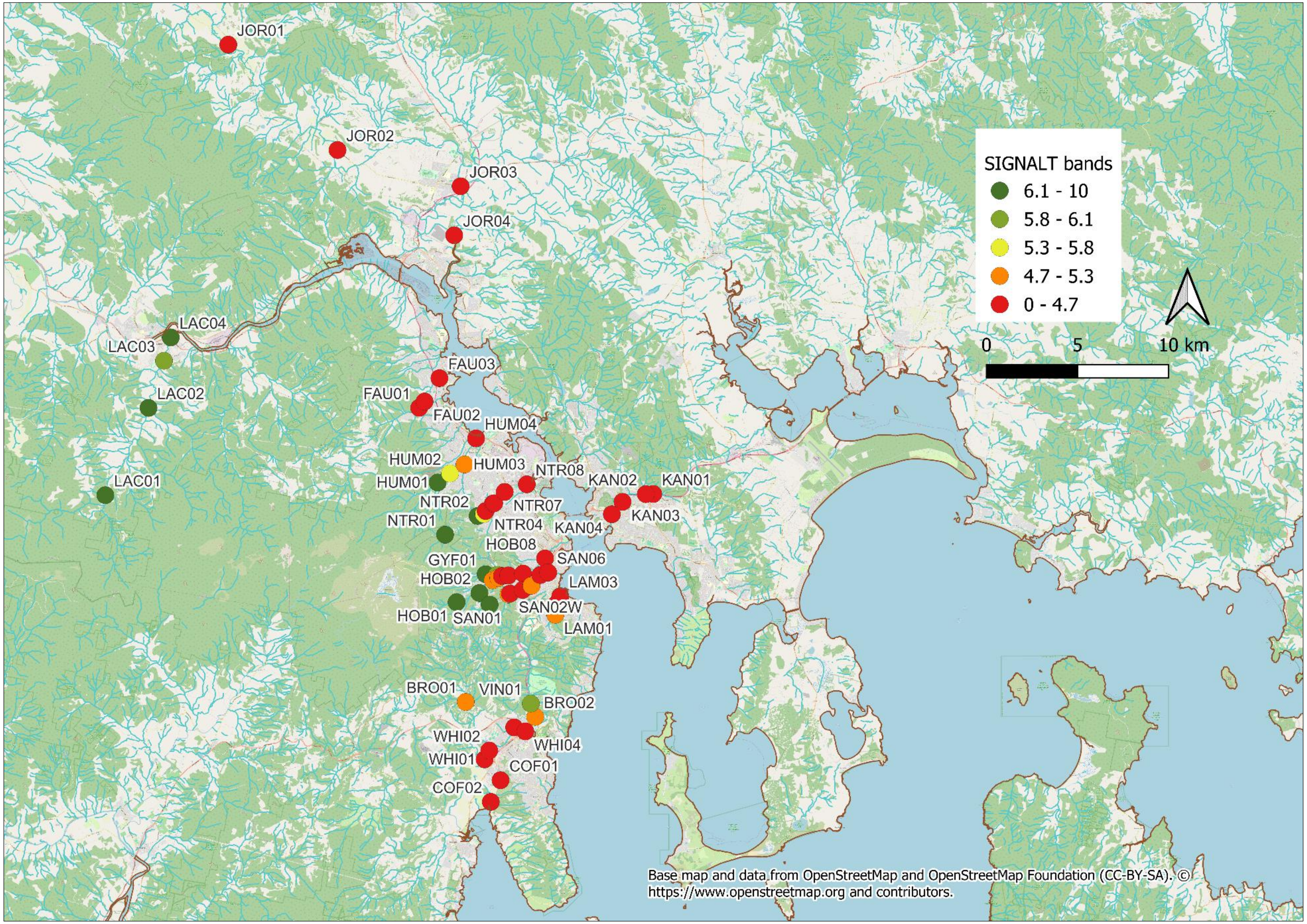

Figure 1 All 56 sites sampled as part of the Derwent Estuary tributaries waterbug sampling project. Colours use weighted SIGNALT, higher scores (green) indicate sites in better condition.

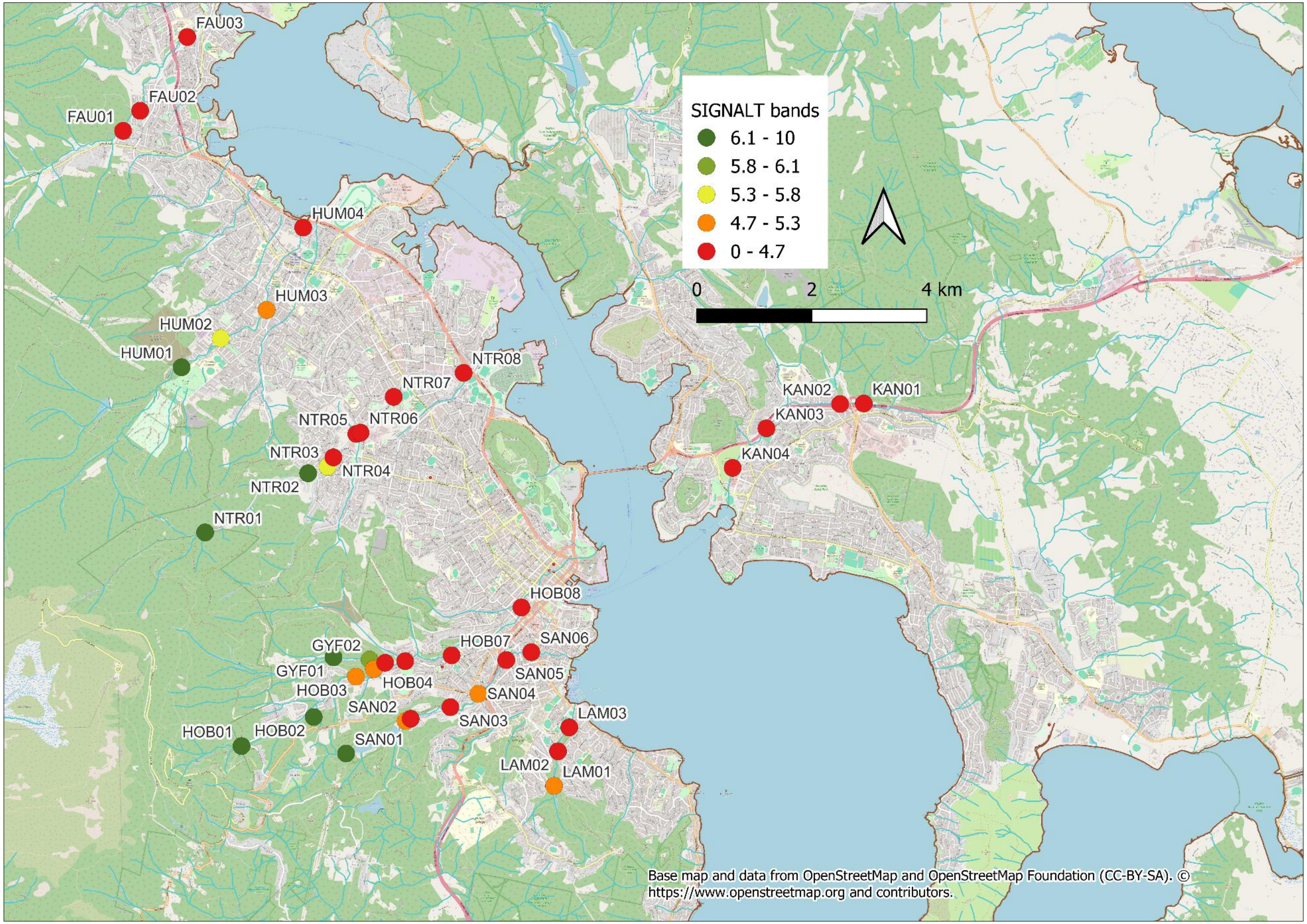

Figure 2 Sites within urban Hobart and surrounds sampled as part of the Derwent Estuary tributaries waterbug sampling project. Colours use weighted SIGNALT, higher scores (green) indicate sites in better condition.

Table 1 Sites sampled for the Derwent Estuary tributaries freshwater ecology surveys. Listed alphabetically and numbered upstream to downstream. Coordinates are WGS84 digital degrees.

Site Code	Site Description	Date	Waterway	Latitude	Longitude
BRO01	Browns at Summerleas Road	15/12/2024	Browns River	-42.95728	147.26944
BRO02	Browns River downstream of Browns Road	15/12/2024	Browns River	-42.96468	147.31632
COF01	Coffee Creek upstream of Penrhyn pond	20/10/2024	Coffee Creek	-42.99593	147.29291
COF02	Coffee Creek lower site	20/10/2024	Coffee Creek	-43.00663	147.28637
FAU01	Faulkner Rivulet off Apanie crescent	24/11/2024	Faulkner Rivulet	-42.81186	147.23803
FAU02	Faulkner Rivulet upstream Boondar Street	24/11/2024	Faulkner Rivulet	-42.80872	147.24166
FAU03	Faulkner Rivulet upstream of CC Access	24/11/2024	Faulkner Rivulet	-42.79718	147.25171
GYF01	GYF01 Guy Fawkes Rivulet upstream	11/10/2024	Guy Fawkes Rivulet	-42.89416	147.28289
GYF02	GYF02 Guy Fawkes Rivulet willow site	11/10/2024	Guy Fawkes Rivulet	-42.89451	147.29058
HOB01	HOB01 Hobart Rivulet off Strickland Ave upper	11/10/2024	Hobart Rivulet	-42.90801	147.26328
HOB02	HOB02 Hobart Rivulet on Strickland Ave lwr	11/10/2024	Hobart Rivulet	-42.90347	147.27868
HOB03	HOB03 Hobart Rivulet upstream of brewery	11/10/2024	Hobart Rivulet	-42.89717	147.28767
HOB04	HOB04 Hobart Rivulet downstream of brewery	11/10/2024	Hobart Rivulet	-42.896	147.29148
HOB05	HOB05 Hobart Rivulet @ Cascade gardens	11/10/2024	Hobart Rivulet	-42.89501	147.29389
HOB06	HOB06 Hobart Rivulet downstream tip outflow	7/10/2024	Hobart Rivulet	-42.89475	147.29817
HOB07	HOB07 Hobart Rivulet upstream of Anglesea bridge	7/10/2024	Hobart Rivulet	-42.89384	147.30809
HOB08	HOB08 Hobart Rivulet @ Collins Street	7/10/2024	Hobart Rivulet	-42.88636	147.32296
HUM01	Humphreys Rivulet end of Chapel Street	21/10/2024	Humphreys Rivulet	-42.84883	147.2505
HUM02	Humphreys Rivulet @ Chapel Street	21/10/2024	Humphreys Rivulet	-42.84431	147.25885
HUM03	Humphreys Rivulet downstream of Brent Street	21/10/2024	Humphreys Rivulet	-42.83987	147.26864
HUM04	Humphreys Rivulet downstream at Grove Road	21/10/2024	Humphreys Rivulet	-42.82699	147.27643
JOR01	Jordan River downstream of Andersons Road bridge	16/10/2024	Jordan River	-42.63179	147.10927
JOR02	Jordan River @ Marstrand memorial bridge	16/10/2024	Jordan River	-42.6841	147.18297
JOR03	Jordan River @ Polonia Bridge	16/10/2024	Jordan River	-42.70207	147.26598
JOR04	Jordan River lowest, upstream Cove Hill Road	16/10/2024	Jordan River	-42.72638	147.26167
KAN01	Kangaroo Bay Rivulet upstream of Flagstaff Gully Link	17/10/2024	Kangaroo Bay Rivulet	-42.85449	147.39596
KAN02	Kangaroo Bay @ Bounty Street	17/10/2024	Kangaroo Bay Rivulet	-42.85456	147.39091
KAN03	Kangaroo Bay @ Schouten Street	17/10/2024	Kangaroo Bay Rivulet	-42.85837	147.3752
KAN04	Kangaroo Bay @ Council Chambers	17/10/2024	Kangaroo Bay Rivulet	-42.86455	147.368
LAC01	Lachlan River @ Lachlan Road	29/09/2024	Lachlan River	-42.85507	147.02635
LAC02	Lachlan River @ Moores Road	29/09/2024	Lachlan River	-42.8119	147.05547
LAC03	Lachlan River @ Humphrey Street	29/09/2024	Lachlan River	-42.78857	147.06591
LAC04	Lachlan River at Tynwald Park	29/09/2024	Lachlan River	-42.77698	147.07044
LAM01	LAM01 Lamberts Rivulet	6/10/2024	Lamberts Rivulet	-42.91423	147.32992
LAM02	LAM02 Lamberts Rivulet @ Churchill Avenue	6/10/2024	Lamberts Rivulet	-42.90884	147.33076
LAM03	LAM03 Lamberts Rivulet	6/10/2024	Lamberts Rivulet	-42.9051	147.33317
NTR01	Newtown Rivulet NTR01	1/10/2024	Newtown Rivulet	-42.87464	147.25552
NTR02	Newtown Rivulet NTR02	1/10/2024	Newtown Rivulet	-42.8654	147.27748

NTR03	Newtown Rivulet NTR03	1/10/2024	Newtown Rivulet	-42.86436	147.28163
NTR04	Newtown Rivulet NTR04	1/10/2024	Newtown Rivulet	-42.86291	147.28287
NTR05	Newtown Rivulet NTR05	1/10/2024	Newtown Rivulet	-42.85925	147.28775
NTR06	NewTown Rivulet NTR06	1/10/2024	Newtown Rivulet	-42.85905	147.28866
NTR07	Newtown Rivulet NTR07	1/10/2024	Newtown Rivulet	-42.85346	147.29573
NTR08	Newtown Rivulet NTR08	1/10/2024	Newtown Rivulet	-42.84971	147.31064
SAN01	SAN01 Sandy Bay Rivulet upstream	22/11/2024	Sandy Bay Rivulet	-42.90918	147.28557
SAN02	SAN02 Sandy Bay Rivulet	22/11/2024	Sandy Bay Rivulet	-42.90411	147.29828
SAN02W	SAN02B willow site d/s of SAN02	22/11/2024	Sandy Bay Rivulet	-42.90375	147.29934
SAN03	SAN03 Sandy Bay Rivulet upstream Romilly Street	22/11/2024	Sandy Bay Rivulet	-42.90194	147.30781
SAN04	SAN04 Sandy Bay Rivulet at Lynton ave	22/11/2024	Sandy Bay Rivulet	-42.89986	147.31381
SAN05	SAN05 Pillinger/Parliament Street	22/11/2024	Sandy Bay Rivulet	-42.89458	147.31973
SAN06	SAN06 Sandy Bay Rivulet	22/11/2024	Sandy Bay Rivulet	-42.89335	147.32507
VIN01	Vincents Rivulet off Proctors Road	15/12/2024	Vincents Rivulet	-42.9581	147.31336
WHI01	Whitewater Creek upstream Turquoise Way	15/12/2024	Whitewater Creek	-42.98565	147.28218
WHI02	Whitewater Creek at Java Head Link Road	15/12/2024	Whitewater Creek	-42.98127	147.2853
WHI03	Whitewater Creek upstream of Whitewater Crescent	15/12/2024	Whitewater Creek	-42.96986	147.30214
WHI04	Whitewater Creek downstream of Kingston park	15/12/2024	Whitewater Creek	-42.97182	147.30966

What does a healthy river look like?

In natural areas forests and the riparian zone provides plenty of shading for rivers. The abundance of surrounding vegetation results in plenty of leaf litter and woody debris, which creates an abundance of different habitats for the organisms that live in rivers.

Typically, leaf litter and sticks washed down from surrounding forest would provide food and habitat for aquatic life in rivers. There would be relatively few plants and algae living within the river system due to low light levels and the relatively fast flowing nature of these waterways.

A wide variety of animals make their home in rivers, including:

- platypus
- rakali (water rats)
- several species of fish
- waterbugs (also known as freshwater macroinvertebrates).

What do urban rivulets look like?

In an urban waterway, everything from habitat to water quality tends to be modified.

In areas with lots of infrastructure waterways tend to be managed to minimise the risk of flood damage on nearby structures – roads, houses, buildings. These modifications change and limit the habitats available in a waterway and usually reduce aquatic wildlife, including native fish species and waterbugs.

Urban waterways are characterised by much faster flowing water systems. Concrete and tarmac shed rainwater swiftly, and stormwater systems are designed to remove standing water as quickly as possible. Faster moving water often makes urban rivulets highly erosive places - channels are forced to move larger amounts of faster water than if the water was allowed to percolate into the soil across a catchment. This additional hydraulic stress often damages aquatic habitat by scouring, smothering or eroding sediment as water moves swiftly through the rivulet.

Pollutants are another threat to the water quality and ecological health of Hobart's urban rivulets. The long list of pollutants that can find their way into urban rivulets can be simplified by looking at where the pollutants come from. Nutrients and organic pollution often come from ineffective septic systems and sewer system overflows. Animal faecal material, typically from dogs and birds such as pigeons or waterfowl, can also have an impact on rivulet health. Oil, petrol and other hydrocarbons wash off road surfaces and into stormwater systems and then urban rivulets. Herbicides, pesticides, petrol, oil, cleaning products, paint, concrete wash and sediment from new housing sites as well as road construction can all find their way into waterways through the stormwater system, further deteriorating the health of Hobart's rivulets.

As waterways pass through urban areas water quality degrades and fewer types of waterbug can survive. Those waterbugs that do survive in the poorer urban rivulet environment create a subset of more tolerant waterbugs. Fish are also sensitive to water quality and may be impacted by poorer water quality. Larger animals such as rakali and platypus can persist if there is enough food and suitable streamside habitat. Brown trout (*Salmo trutta*) is an invasive species that occurs throughout urban rivulets. It can also impact waterbug diversity and smaller fish species as it is an efficient predator.

National Waterbug Blitz and SIGNALT scores

The National Waterbug Blitz is a citizen science program that uses the waterbugs in a stream, creek or river to assess the ecological health of that waterway. The program collects data with The Waterbug App (freely available for android and iOS/Apple mobile devices). This data is then mapped, analysed and published on the National Waterbug Blitz website - waterbugblitz.org.au. The program uses SIGNALT to assess sites. This is a variant of the SIGNAL 2 scoring system (Chessman, 2003). The program allows for a rapid assessment of the ecological health of a waterway that contributes to a broader knowledge of freshwater ecosystems.

SIGNALT is calculated using known associations between waterbugs and the levels of impact they can withstand. Each waterbug has a SIGNALT grade, those that are sensitive to pollution are given grades closer to 10, while those that can tolerate pollution get lower grades (Figure 2). A site assessment score is calculated by averaging the grades of all the waterbugs found at that site. This average can be weighted by the abundances of the waterbugs to produce a weighted SIGNALT score. When SIGNALT is used in the National Waterbug Blitz the default measure is weighted SIGNALT as it is more stable. Weighted and unweighted scores are displayed in this report because sometimes their reasons for differing are informative. Instances where the SIGNALT is higher than the weighted SIGNALT suggest stray high scoring waterbugs from upstream, flagging a scenario where higher diversity upstream could act as a sump for the immigration of high scoring waterbugs should conditions improve at the site. For example, if water quality improved or habitat rehabilitation was carried out. Mayflies (Figure 4) are considered in this study as indicators of good ecological health. In many waterways that pass from forested areas into urban landscapes around Australia there is a discrete location where the ecological health becomes so degraded that they disappear from the assemblage.

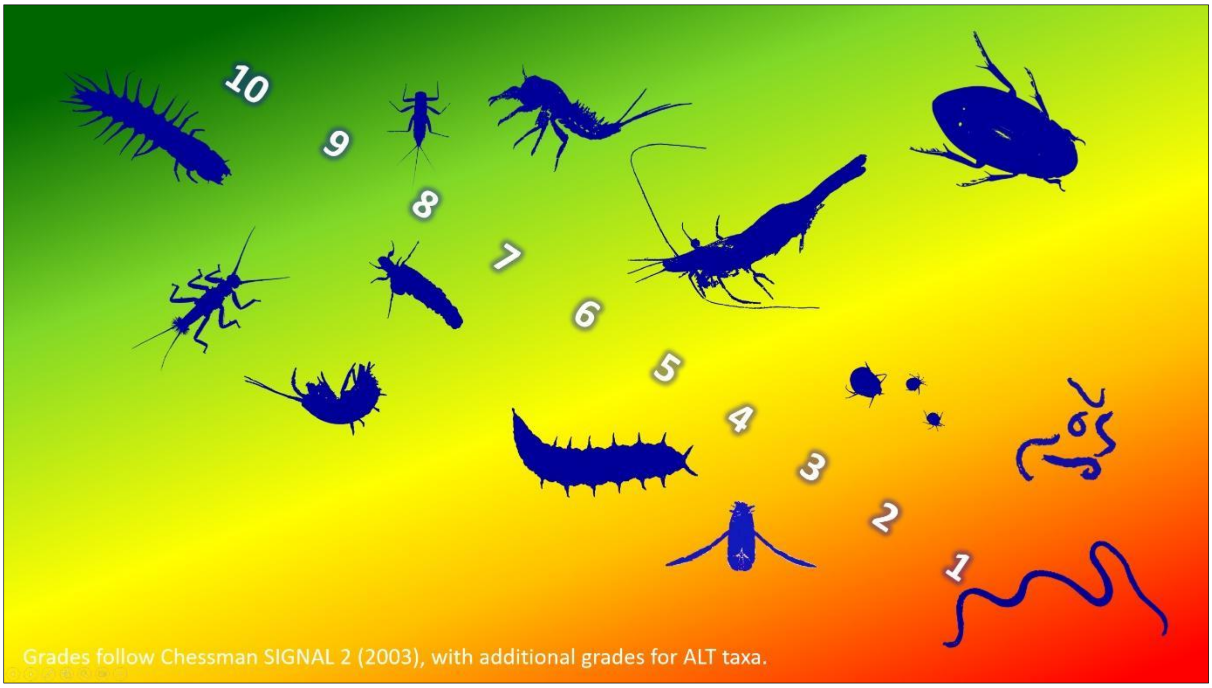

Figure 3 Diagrammatic representation of the association between different waterbugs and the levels of impact they can tolerate. Animals like worms (to the right) can tolerate lots of pollution, and therefore have a low grade. Green is associated with natural/healthy sites and waterbugs that are intolerant of pollution and habitat loss.

Figure 4 Mayflies are indicators of good ecological health in a waterway. This is a tinsel-gilled mayfly nymph (Atalophlebia sp.) from the lower site on the Lachlan River.

Methods – Waterbug data

The following section roughly describes the process for taking samples that can be used for the National Waterbug Blitz. Detailed "How To" videos can be found here:

https://www.waterbugblitz.org.au/cb_pages/resources.php?category_id=3915

Choosing a Site

Sites are roughly 50 metres of waterway, selected to be close to an area of interest, but also to provide the best selection of habitats in that reach of river.

The Waterbug App begins a sample after the user selects "Start Waterbug Survey" from the Home screen (Figure 5).

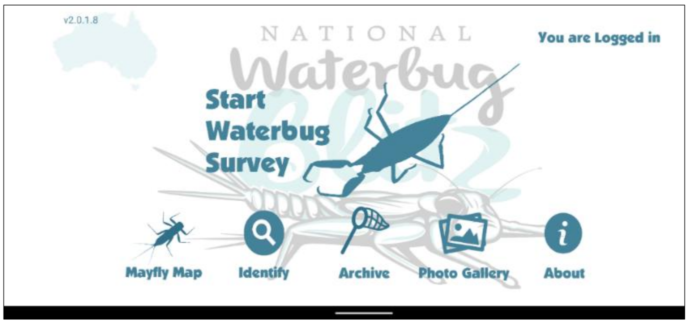

Figure 5 The Home screen from The Waterbug App.

For a waterway assessment that is intended for mapping on the National Waterbug Blitz database (https://www.waterbugblitz.org.au/explore.php), the user selects "Detailed" survey level, and "River" on the Site Details page (Figure 6). The user then adds the waterbody and adds a site photo. The app automatically logs the location; this point can be modified before the sample is submitted by tapping on the red location icon and re-positioning the site on the map. This functionality is only available when the mobile device has access to Wi-Fi or a data network to provide the necessary maps.

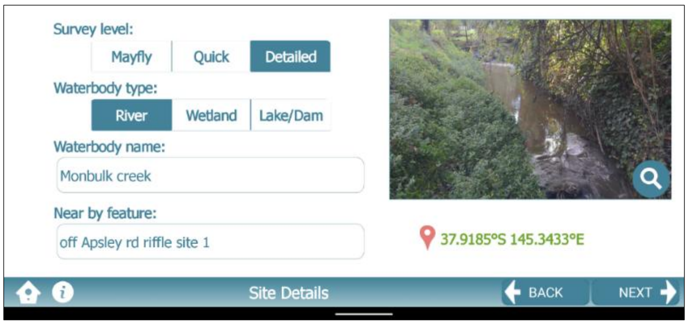

Figure 6 The Site Details page from The Waterbug App.

Field Sampling / data collection

Sampling uses a modified version of field methods developed for the AUSRIVAS program (Tiller and Metzeling 1998). The different habitats within the site are identified and coarsely quantified as percentage cover of the wetted area in the reach. These numbers are entered on the Habitat page of The Waterbug App (Figure 7).

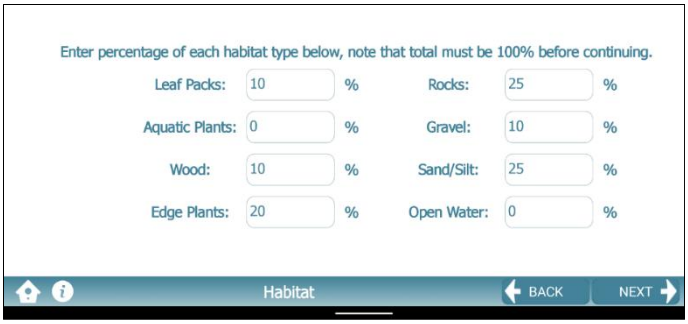

Figure 7 The Habitat page from The Waterbug App.

These habitats are then sampled with a net (30cm base, square or triangular, mesh size 250-500micron - Figure 8), ensuring that a sample from each of the habitats is taken. Between 5 and 10 metres of stream should be sampled, if possible, but some sample MUST be taken from each of the habitats recorded in the previous step. The samples from each habitat are rinsed and then combined in a bucket.

Figure 8 Nets used for river sampling. Note the flat base of the net that can be pressed against the stream bed.

Detritus and waterbugs from the sample are placed in large white plastic trays (Butcher's display or kitty litter are ideal) ensuring the material is covered with about 50mm of clear water (Figure 9). As each of the different waterbugs becomes apparent it is transferred with either a pipette or plastic spoon to an ice cube tray. This process continues until there is an assortment of waterbugs in the ice cube tray. At this point the animals should be identified and added to the Data/Ice cube Tray page of the app. This process is guided in The Waterbug App and requires the user to take a photo of each of the different waterbugs for QAQC purposes when the data is added to the database. Data also includes a rough count of the number of each of individuals of each of the different types of waterbug in the sample. As new types of waterbug are discovered in the sample (which may involve searching through multiple trays loads of detritus until the whole bucket of sample has been examined), they are all added to the app until no new types occur.

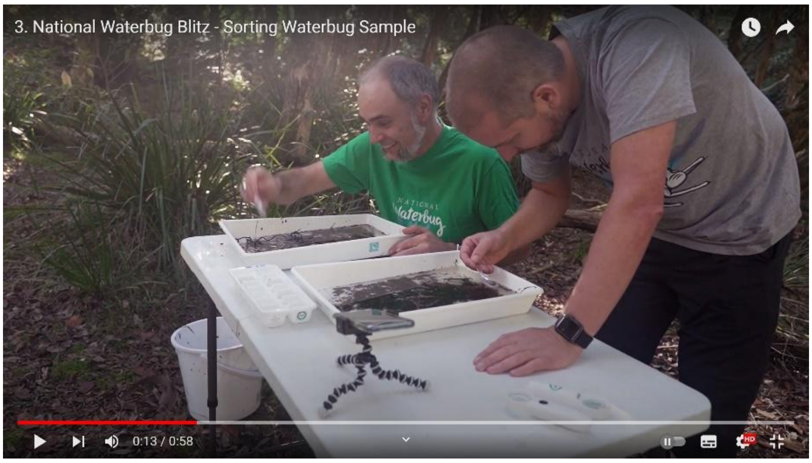

Figure 9 Sorting waterbugs from detritus (left) and the equipment needed for this process (right).

Once the Data/Ice cube Tray page of the app is completed, tick the box on the next page confirming that this survey is to be a river health assessment. Enter any notes, and on the final page the user can preview the results before they are submitted. If there is no connectivity at the sampling site, the app will send the data later when it becomes available.

Methods – Water quality data

Water Quality was measured using a Hanna Multi probe. HI9829, deployed with a probe compliment for the following parameters: Temp.[°C], pH , EC[µS/cm], TDS [ppm], D.O.[%], D.O.[ppm], Turbidity.[NTU], The probe was calibrated each morning prior to sampling and again if results were noticeably odd.

During measurement the probe was left in situ until measurements (especially pH) stabilised. This usually occurs within 5 minutes.

Results

The results from the waterbug sampling are figured across Figure 10 and Figure 11 In Figure 10 SIGNALT Score and SIGNALT Score weighted are displayed. These are described in the previous section. In Figure 11 Mayfly data is presence/absence. Number of taxa is the number of different types of animal in the sample, also referred to as diversity. Waterbodies are separated along the x axis in figures and all waterways have upstream sites to the left, progressing downstream to the right. In all these figures Vincents Rivulet (VIN01) is included as a tributary of Browns River. Rivulets are arranged alphabetically to the right.

Figure 12 to Figure 15 display water quality data. Waterbodies are separated along the x axis in figures and all waterways have upstream sites to the left, progressing downstream to the right. Note there was no data recorded for JORD03, TDS data is missing from all the Jordan River sites and all the Kangaroo Bay Rivulet sites except KAN01.

Figure 16 shows the percentage breakdown of different land uses in the catchments of each of the Tributaries. These have been calculated at the lowest site sampled on each waterway. Data is from site outputs in the National Waterbug Blitz.

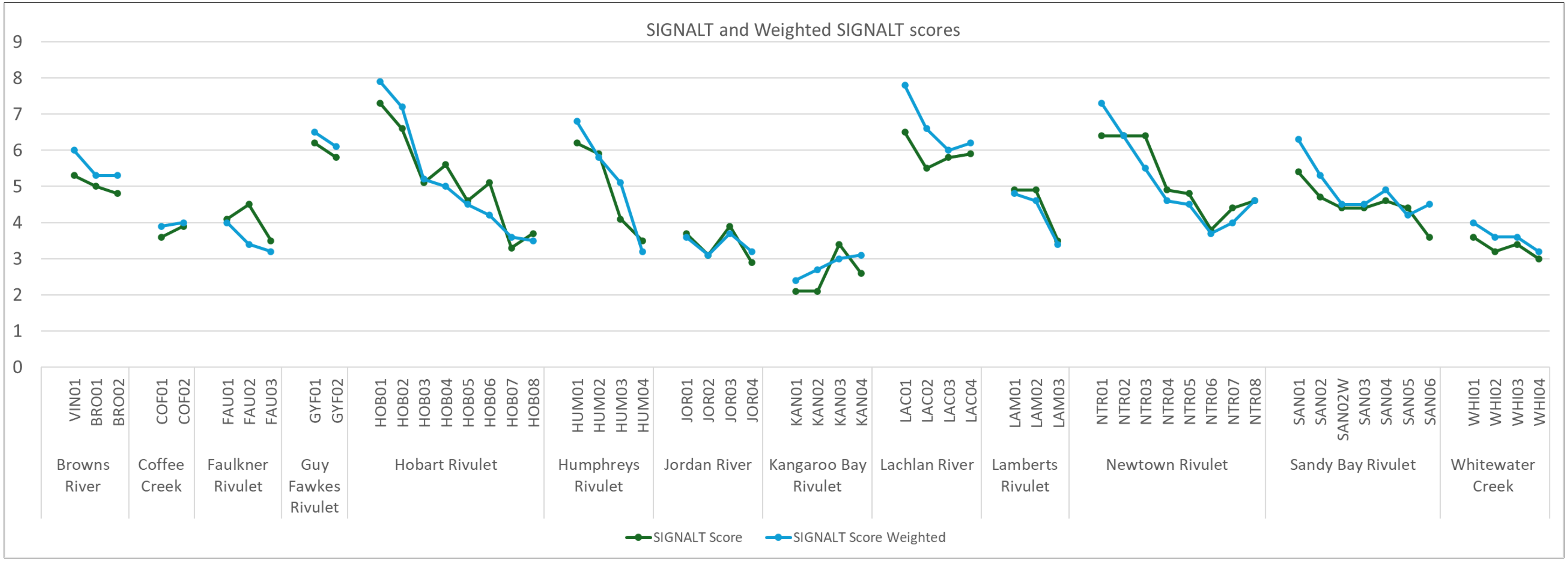

Figure 10 SIGNALT and SIGNALT Weighted for sites across major tributaries of the Derwent Estuary.

Observations

- Mostly decreasing trends downstream. Coffee Creek, Jordan River and Kangaroo Bay Rivulet in contrast are flat or slightly the reverse of the downstream trend in decreasing SIGNALT and SIGNALT weighted seen in other rivers.
- SIGNALT Weighted is consistently less than SIGNALT in the lower sections of Faulkner Rivulet, Hobart Rivulet, and Newtown Rivulet.

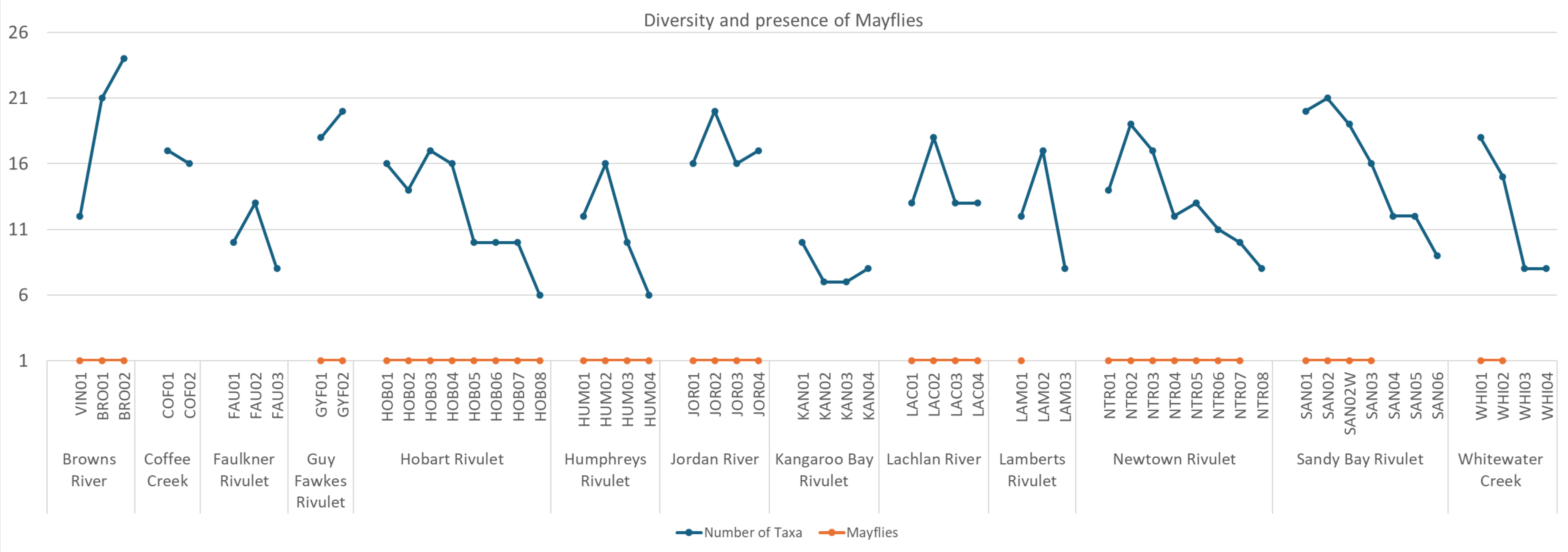

Figure 11 Number of taxa (Diversity) and presence of Mayflies for sites across major tributaries of the Derwent Estuary.

Observations

- Mostly waterways show decreasing trends in diversity/number of taxa downstream. Exceptions to this are Browns River and Guy Fawkes Rivulet, although the pattern for Browns Creek is driven mainly by the low score for Vincents Rivulet and the two sites on the latter are very similar.
- No mayflies were observed in Coffee Creek, Faulkner Rivulet, Kangaroo Bay Rivulet. Mayflies were absent from the lower sites at Lamberts Rivulet, Newtown Rivulet, Sandy Bay Rivulet and Whitewater Creek.

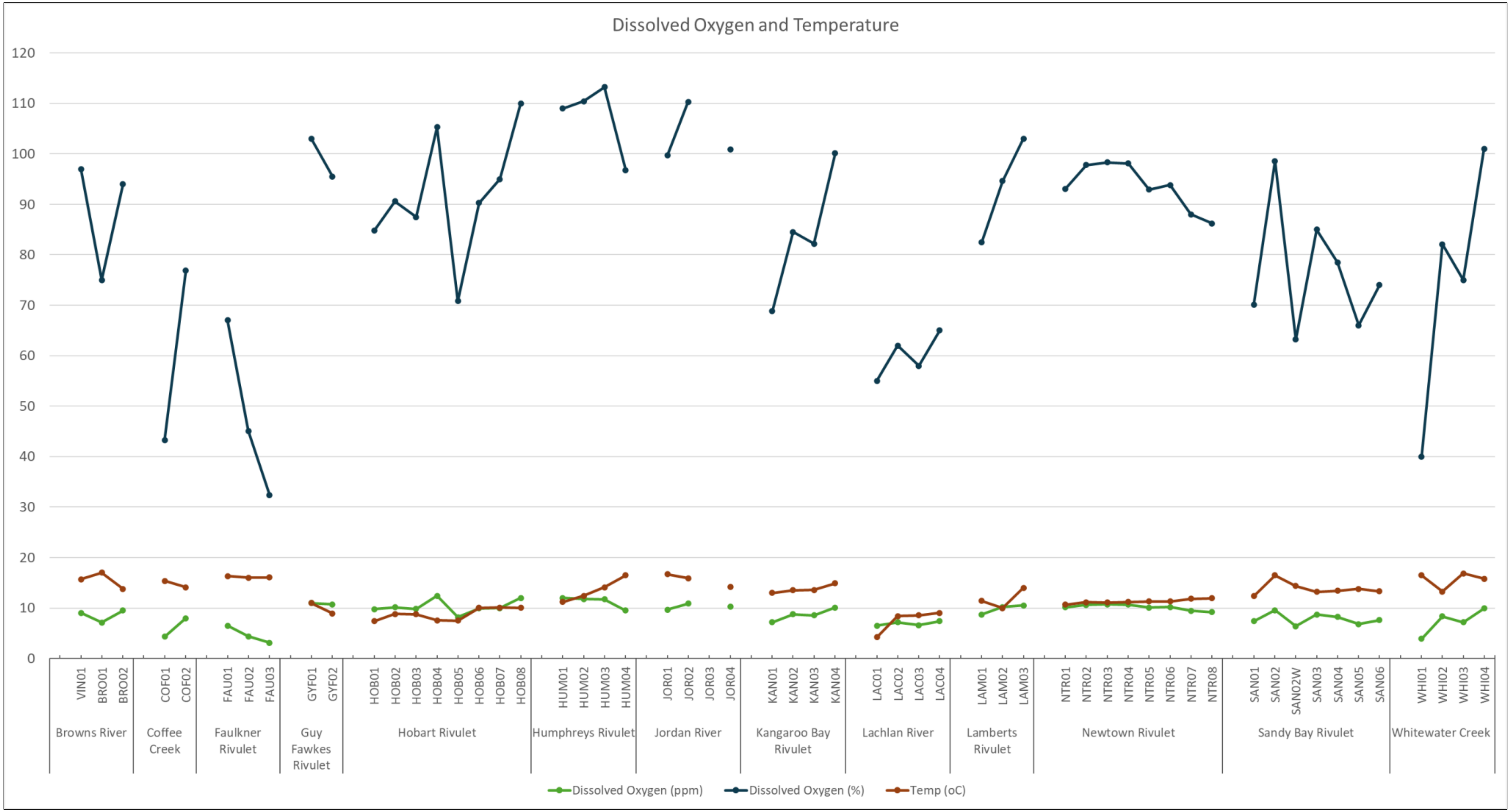

Figure 12 Dissolved Oxygen and Temperature for sites across major tributaries of the Derwent Estuary.

Observations

- Limited trends downstream.
- Temperature and Dissolved Oxygen (mg/L) often mirror one another along a waterway, increases in Temperature matching drops in Dissolved Oxygen and vice versa.

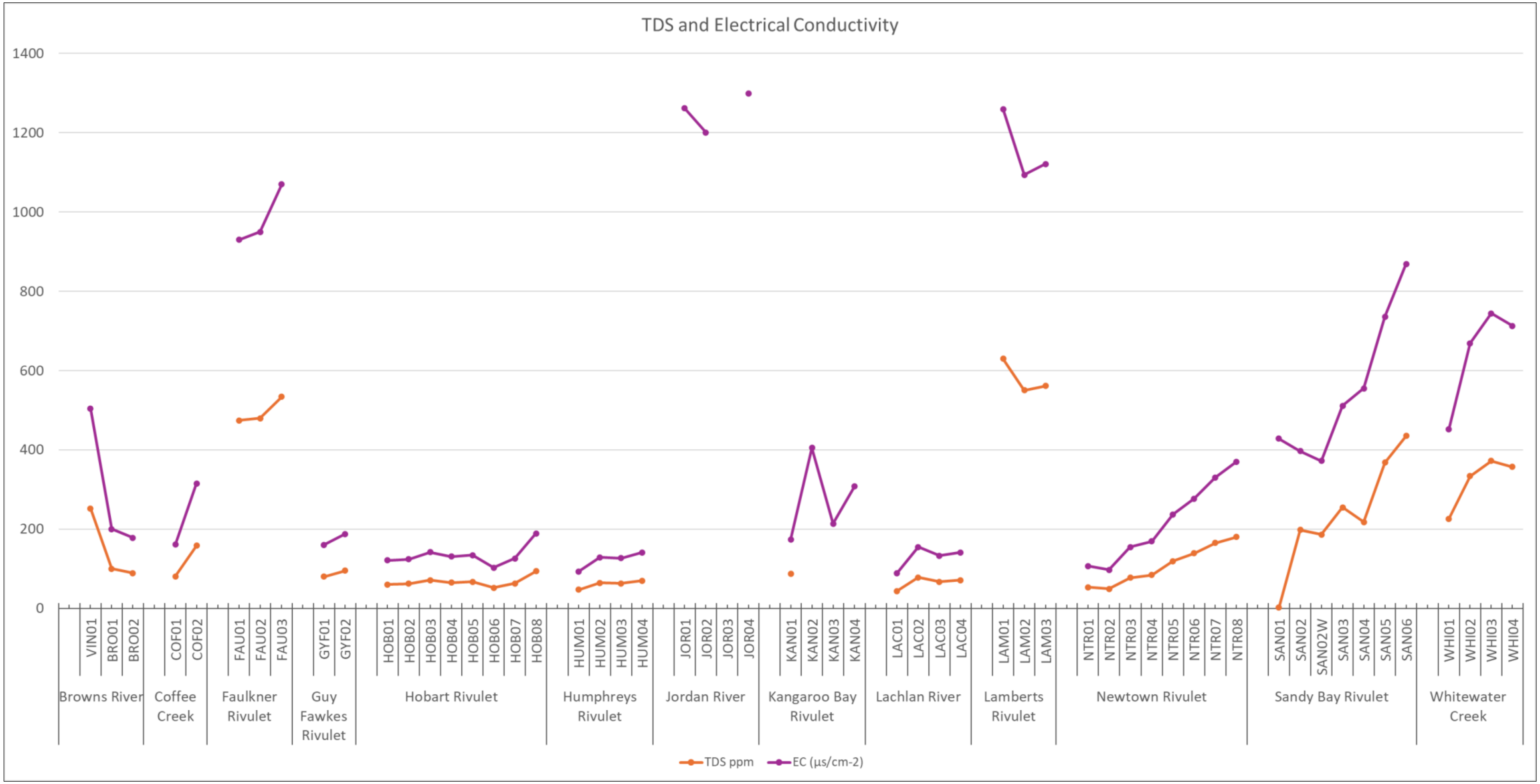

Figure 13 Total Dissolved Solids (TDS) and Electrical Conductivity (EC) for sites across major tributaries of the Derwent Estuary.

Observations

- Mostly increasing trends downstream. Browns River is an exception.
- High EC observed at Faulkner Rivulet, Jordan River and Lamberts Rivulet.

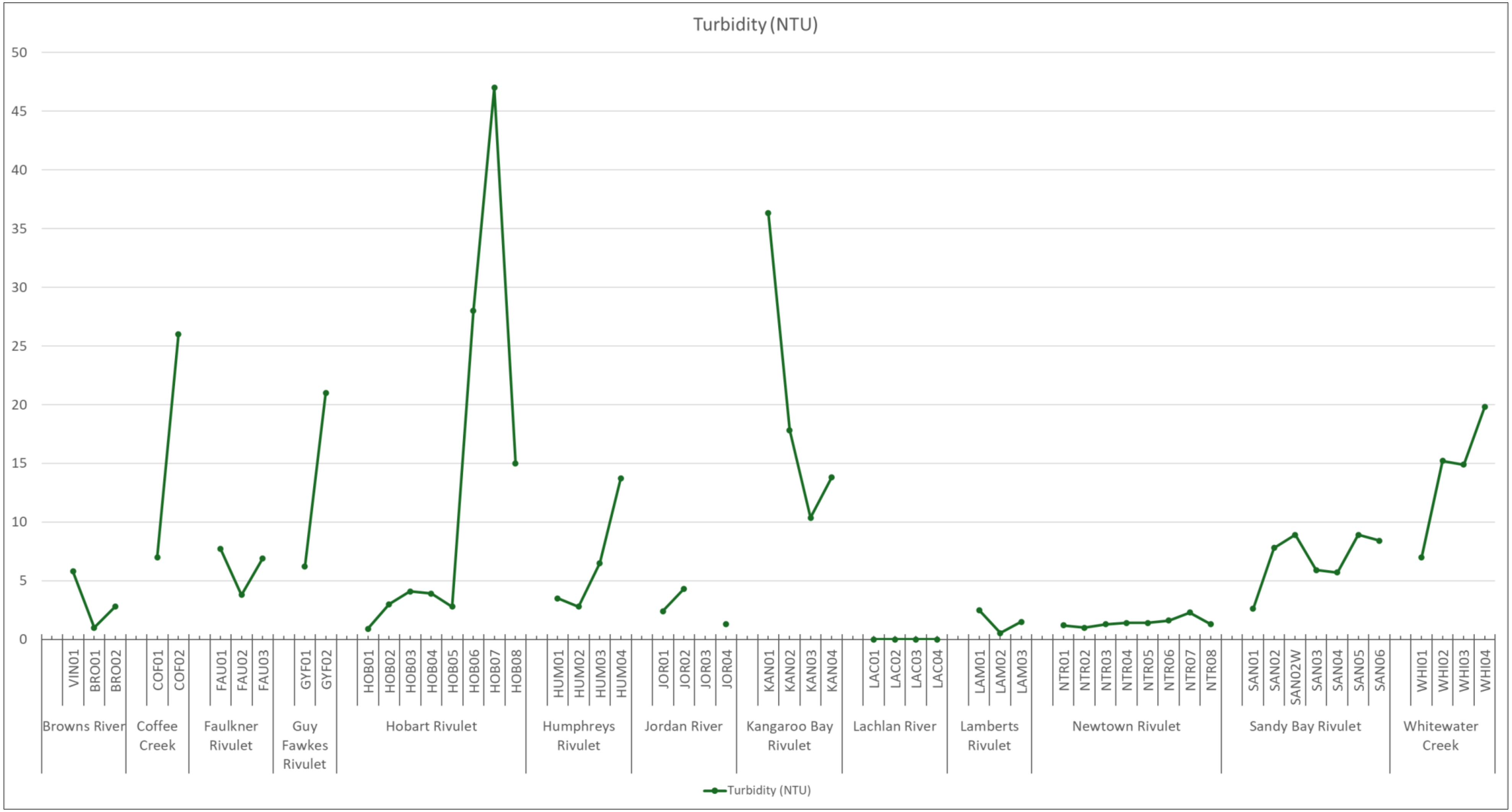

Figure 14 Turbidity for sites across major tributaries of the Derwent Estuary.

Observations

- Limited trends overall. Mostly low values.
- Downstream increases in some waterways.

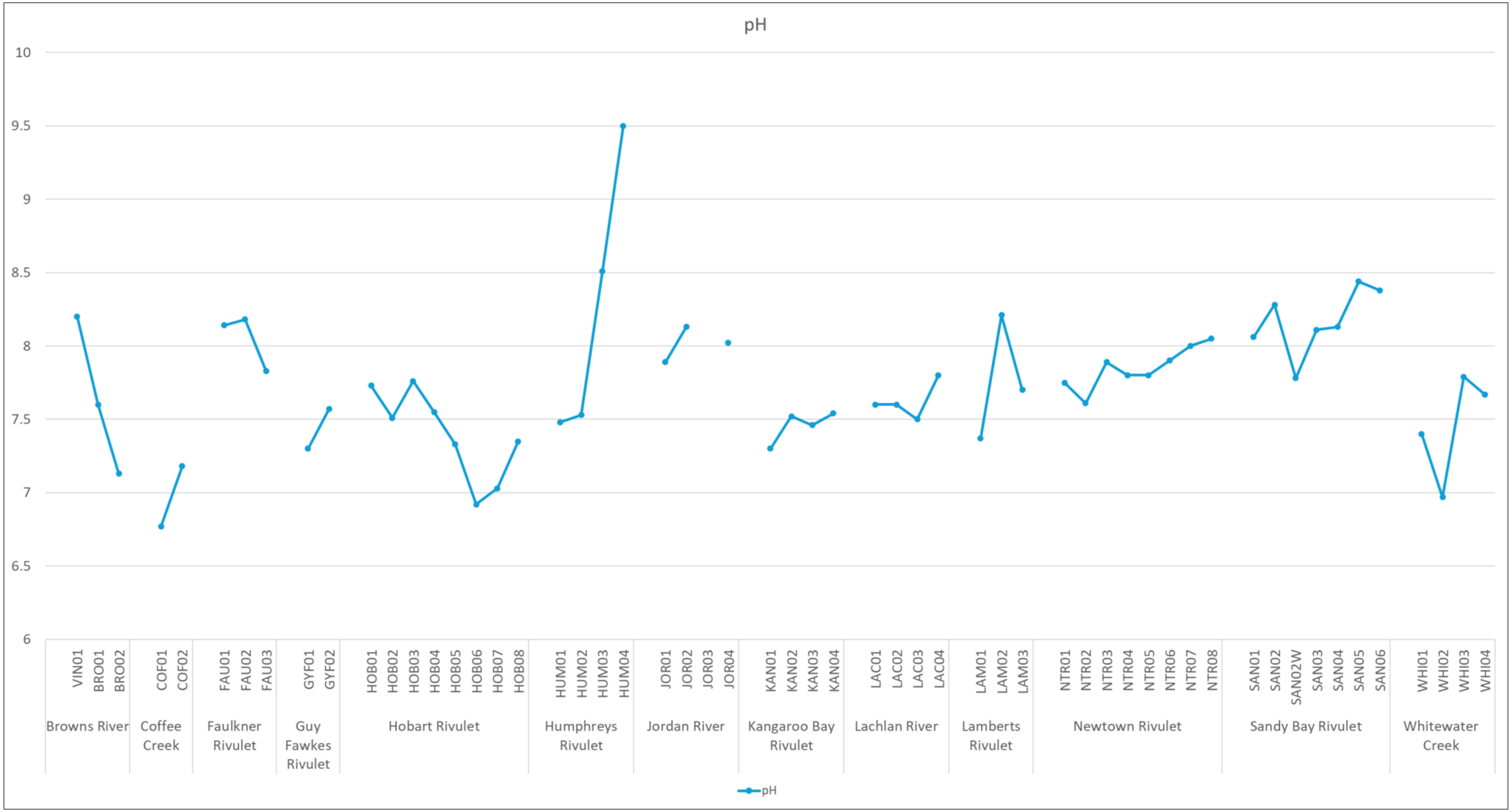

Figure 15 pH for sites across major tributaries of the Derwent Estuary.

Observations

- Limited trends overall. Consistent increase along Newtown Rivulet downstream.
- High values in Humphreys Rivulet.

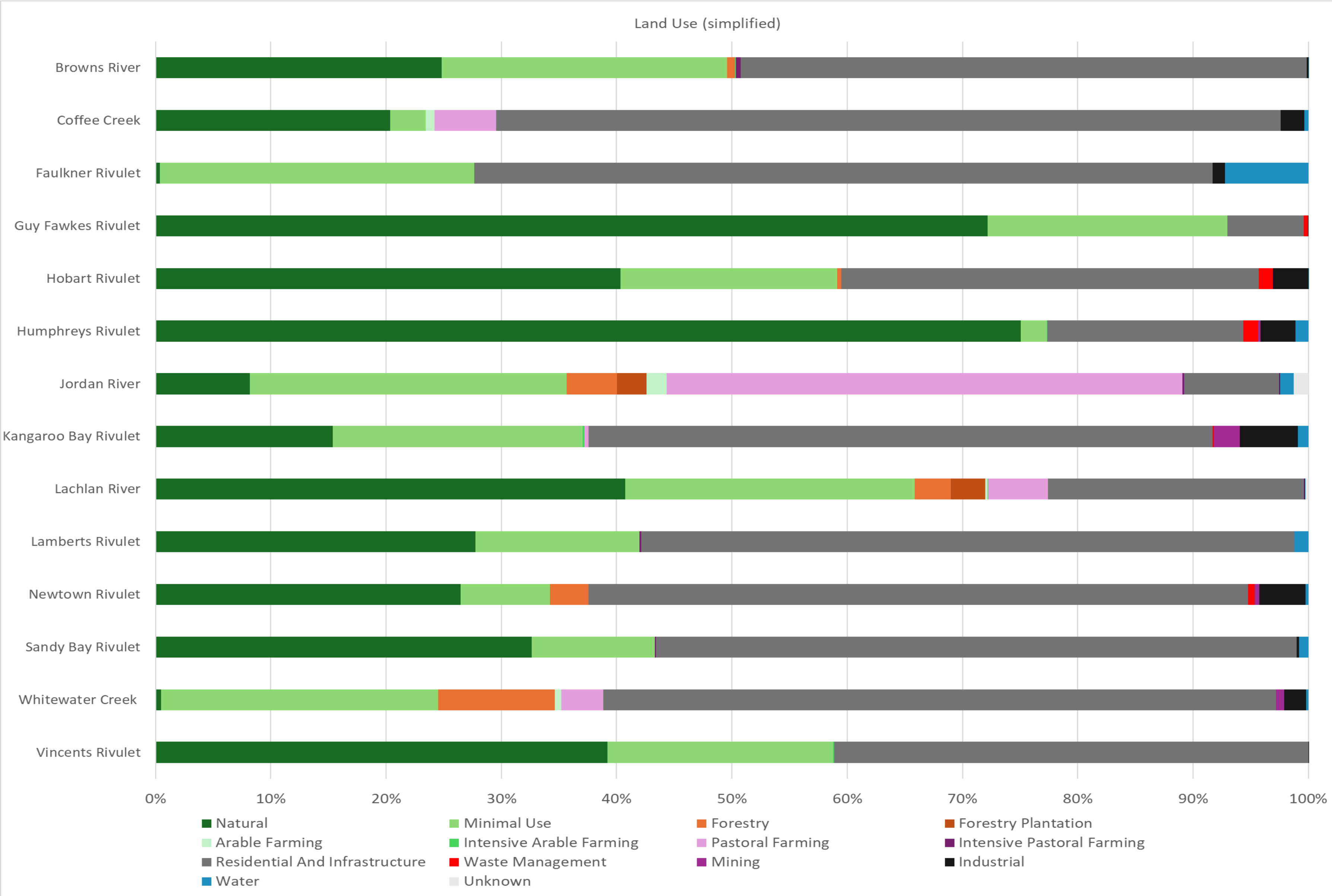

Figure 16 Land use outputs for the lowest sites on each of the Rivulets sampled. Values are expressed as percentages of catchment area upstream of the site. Outputs from The National Waterbug Blitz.

Discussion

This section is broken into commentary on general trends in the results, followed by a discussion of each of the individual catchments sampled and an overall summary of outcomes.

Land Use

All of the rivers sampled in this report demonstrated a decline in ecological health as they passed downstream into many of the tributaries on the western side of the Derwent Estuary (see Figure 1) have headwaters in forested hilly catchments. These rivers show similar patterns, starting with high SIGNALT scores, which reduce as the waterways pass through more intense land uses such as grazing or cropping agriculture or residential/infrastructure areas. At some point along this gradient mayflies disappear. Of all the water quality parameters, EC best matches the biological patterns, increasing steadily down each of these waterways (Figure 13).

With the exception of the small tributaries (Guy Fawkes Rivulet and Vincents Rivulet), the values in Figure 16 are calculated at the downstream end of each of the catchments and therefore show an approximation of the land use for the entire catchment. Most of these have at least 50% of their area covered with intense land uses such as: residential and infrastructure, Waste Management, Mining (includes gravel extraction for roads) and industrial. The Lachlan River, the Jordan River, Humphreys Rivulet and Hobart Rivulet have less than 50% of their catchments covered by these intense land uses and demonstrate interestingly different levels of ecological health. The Lachlan River is in good condition all the way to its junction with the Derwent Estuary, despite a slight response to impacts (likely associated with stormwater) as it passes through New Norfolk. The Jordan River is a large non-perennial catchment with lots of agriculture along it. It has SIGNALT scores between 3 and 4 and these vary slightly as the River passes through more land-use-intense areas, but the strongest effect here is likely the regular/seasonal drying of the river. SIGNALT assessments are more consistent (easier to interpret) when applied to perennial waterways (see the following section). Both Humphreys and Hobart Rivulet show similar patterns of decline in ecological health as the rivulet passes through urban areas. The larger number of sampling sites on Hobart rivulet allows multiple changes in ecological health to be assigned to places where the rivulet interacts with sources of pollution such as damaged sewerage infrastructure and stormwater inflow carrying pollutants and rubbish from adjacent roads (see The State of the Rivulets report (Gooderham, 2023). In contrast the 4 sites on Humphreys Rivulet show severe impacts almost immediately once the rivulet reaches the urban area.

Ephemeral rivers

Coffee Creek and Kangaroo Bay Rivulet are both known to be ephemeral, ceasing to flow most summers. The Jordan River is also regularly dry. The dry riverbed and even a cease in constant flow creates a break in continuity for aquatic organisms and tends to reduce the biodiversity found at these sites, correspondingly reducing all of the SIGNALT indices. In severe cases it may remove mayflies from a system as they mostly require a year instream to mature before emerging and reproducing.

Browns River including Vincents Rivulet

Vincents Rivulet has been included as an upstream site for Browns River. It runs parallel to the Southern Outlet and has multiple spots along its length where rubbish and building wastes are dumped. It scores poorly in diversity compared to lower sites in Browns Creek but has higher scores for both SIGNALT and SIGNALT Weighted than lower in Browns River. High pH and high EC are likely associated with waste dumping at Vincents Rivulet. Browns River is in reasonable condition and skirts a number of industrial and urban areas without lowering SIGNALT scores.

Coffee Creek

Coffee Creek is an ephemeral, pool-dominated waterway running through an urbanised /parkland mix. The lack of mayflies in the creek is likely to reflect the nonperennial nature of the waterway. On the day of sampling flows were very low and the waterway was a barely connected chain of pools.

Faulkner Rivulet

Faulkner Rivulet is a small waterway that is urbanised through much of its lower two-thirds. The stream was small and inaccessible upstream of the urban areas, so all three samples for this study are from within areas of urban land use. High EC, high pH and a lack of mayflies suggest a chronically impacted stream. SIGNALT and SIGNALT Weighted scores were all equivalent to those in the lower halves of rivulets running through urbanised areas (<4.7). Algal growth at FAU02 (report cover, leftmost picture) was extensive despite reasonable shading at the site, suggesting the presence of excess nutrients.

Hobart Rivulet including Guy Fawkes Rivulet

Despite healthy headwaters, Hobart Rivulet exhibits a steady trend of decreasing ecological health down its length into town. The two point source impacts identified for this rivulet were immediately upstream of HOB04 and HOB06. HOB04 (infrastructure including a sewer junction near Old Farm Road), and HOB06 (outflow from the Hobart tip) add slight steps to the downstream degradation trend. The step at HOB06 matches with a strong spike in turbidity that remains elevated from this site downstream along Hobart Rivulet.

Humphreys Rivulet

Humphreys Rivulet demonstrates a textbook response in all biological indices and water quality measures to increasing urbanisation along the length of the rivulet. As the rivulet becomes more urbanised (downstream) the SIGNALT, SIGNALT weighted and diversity all drop (Figure 10 and Figure 11) Dissolved oxygen drops while temperature rises (Figure 12). EC steadily rises (Figure 13), turbidity also increase (Figure 14) as does pH (Figure 15).

Jordan River

The Jordan River is alone amongst the waterways sampled for this study in having an extensive agricultural catchment (Figure 16). It had low SIGNALT scores (Figure 10), but reasonable diversity, and mayflies were present at all the sites sampled (Figure 11). EC was higher in this River than most of the others in the study (Figure 13).

Kangaroo Bay Rivulet

Kangaroo Bay Rivulet has the lowest SIGNALT and SIGNALT weighted score in this study (Figure 10). Interestingly they improve slightly downstream, suggesting more severe impacts at the KAN01, from which the rivulet slowly recovers. Mayflies were absent at all the sites sampled (Figure 11).

Lachlan River

The Lachlan River is in good condition at all four sites sampled for this study.

Lamberts Rivulet

Mayflies were absent from the lower two sites LAM02 and LAM03 (Figure 11). EC was higher in this River than most of the others in the study (Figure 13).

New Town Rivulet

Sampling of the New Town Rivulet headwaters (reference site NTR01) revealed very healthy diversity and abundance of sensitive waterbugs. Further downstream, as the rivulet is increasingly impacted by urbanised areas within the catchment, the trend in ecological health declines steadily

(Figure 10). By the lowest sample site, the rivulet is impacted. There is a marked decline in ecological health between NTR03 and NTR04. Mayflies were absent from the lowest site NTR08 (Figure 11)..

Sandy Bay Rivulet

Sandy Bay Rivulet is in good condition upstream of Waterworks Reserve but drops markedly almost immediately downstream (Figure 10). The ecological health as measured by weighted SIGNALT of the system continues to decline downstream. Mayflies were absent from the three lower sites sampled (SAN04-06, Figure 11).

Whitewater Creek

Whitewater Creek has a semi agricultural upper catchment that rapidly switches to urbanised areas downstream (WHI02). As the rivulet becomes more urbanised (downstream) the SIGNALT, SIGNALT weighted and diversity all drop (Figure 10 and Figure 11) Dissolved oxygen drops while temperature rises (Figure 12). EC steadily rises (Figure 13), turbidity also increase (Figure 14) as does pH (Figure 15).

Outcomes

For those rivers with higher sampling density, results identify areas of concern along each river where nearby point sources of impact and/or diffuse pollution may require action. It also identifies impacts associated with water quality, pollution or general land use intensification. Identifying where assemblages of sensitive waterbugs are replaced with more tolerant ones (an indication of a change in water quality and health) creates a clear visual map for action. It highlights which areas along each river need further investigation and possibly remediation to improve water quality in that part of the river. Sampling intensity was pragmatically constrained for some of the waterways, but the coarse trends suggest areas where further effort could reveal patterns that would assist future management of these waterways.

The results of the 2024 freshwater ecological health surveys of Derwent Estuary tributaries provides the first ever comprehensive report into the ecological condition of the major tributaries draining directly into the Derwent Estuary. It also provides an important scientific baseline for future surveys.

Background Reading

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