Talk Wild Trout 2018

Conference Proceedings

Saturday 11 August 2018
Darebin Arts & Entertainment Centre, Preston Victoria

Target One Million
More Victorians fishing, more often

Your fishing licence fees at work

Victorian Fisheries Authority

Aboriginal acknowledgement

The Victorian Government proudly acknowledges Victoria's Aboriginal community and their rich culture and pays respect to their Elders past, present and emerging.

We acknowledge Aboriginal people as Australia's first peoples, and as the Traditional Owners and custodians of the land on which we work and live.

We recognise the strength of Aboriginal people and communities and value the ongoing contribution of Aboriginal people and communities to Victorian life, through their daily work and at key events, and how this enriches us all.

We recognise all Aboriginal cultures and communities are diverse, and should be celebrated.

We acknowledge that the land and water is of spiritual, cultural and economic importance to Aboriginal people. We embrace the spirit of reconciliation: guaranteeing equality of outcomes and ensuring an equal voice.

We have distinct legislative obligations to Traditional Land Owner groups that are paramount in our responsibilities in managing Victoria's resources.

Partners:

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VRFISH

Arthur Rylah Institute

VFFA

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Foreword

From the spectacular streams of the high country, to our wonderful lakes and reservoir fisheries, Victoria offers some of the best and most scenic wild trout fishing in Australia and we want to make it even better.

That is why we are actively supporting recreational fishing through our *Target One Million* program to get more Victorians fishing, more often. To support trout fisheries, we have:

- ✓ Extended the Wild Trout Fishery Management Program for a further two years,
- ✓ Taken the Talk Trout Conference to Melbourne attracting more than 380 participants,
- ✓ Saved Lake Toolondo,
- ✓ Stocked more than 70 family friendly waters with catchable trout for the school holidays,
- ✓ Listened to trout fishers and improved trout regulations,
- ✓ Developed the GoFishVic Mobile app to expand the angler diary program,
- ✓ Stocked record numbers of yearling trout,
- ✓ Expanded our trout opening fishing festivals (Eildon & Ballarat),
- ✓ Supported the Australian Trout Foundation's trout habitat workshops,
- ✓ Supported Rubicon River fish habitat enhancement project,
- ✓ Extended the jetty at Devilbend Reservoir,
- ✓ Delivered the Angler Riparian Partnership Program with $1 million over 4 years to restore fish habitat,
- ✓ Expanded incubator trials on the Traralgon Creek, Jamieson and Buckland Rivers,
- ✓ Delivered six exciting Vic Fish Kids events to encourage young fisher participation,

I am delighted with the response to this year's Talk Trout Conference. To fill a large entertainment facility in Melbourne shows the Wild Trout Program is truly valued by recreational fishers.

The Andrews Government is serious about developing our recreational fisheries and has committed a record $46 million toward these and other *Target One Million* projects that will be a legacy for many years to come.

I wish every trout fisher the best of luck this season and I'm confident our trout fisheries will continue to support great fishing experiences.

The Hon. Jaala Pulford MP
Minister for Agriculture

Conference Program — Saturday 11 August 2018

9.30 am	Arrival & morning refreshments	Delegates
10.00 am	Conference opens	John Douglas, VFA
10.05 am	Welcome to Country	Wurundjeri Land & Compensation Cultural Heritage Council Aboriginal Corporation
10.15 am	Conference welcome / foreword	Travis Dowling, CEO, Victorian Fisheries Authority
10.25 am	Talk Wild Trout - four years on	Anthony Forster, VFA
10.40 am	Trout fishery management lessons from Idaho	Jim Fredericks, Chief of Fisheries, Idaho Department of Fish and Game
11.20 am	Morning Tea Break	

Theme 1 – About the trout (Session Chair: Kris Leckie, VRFish)

11.45 am	The state of trout in Victoria: 2018 survey results Health cards for six wild trout streams 2018	Dr. Brett Ingram, VFA
12.05 pm	Yearling trout stocking in rivers study-final report	John Douglas, VFA
12.20 am	Panel questions & answers	Delegates, speakers & chair
12.40 pm	Lunch	

Theme 2 – Managing trout (Session Chair: Dermot O'Brien, Victorian Fly Fishing Association)

1.40 pm	Climate and trout – forecast and ground truths	Dr John Morrongiello, University of Melbourne
2.00 pm	Repairing where fish live	Terry George, ATF and Mike Burgess, VRFish
2.15 pm	Jordan Scotty Incubator Trials - first year findings	Matt Byrne, ATF and Brett Ingram, VFA
2.30 pm	Expanding the Diary Angler Program	Taylor Hunt, VFA
2.45 pm	Panel questions & answers	Delegates, speakers & chair
3.05 pm	Afternoon Tea Break	

Theme 3 – Trout on the hook (Session Chair: Travis Dowling, Victorian Fisheries Authority)

3.30 pm	My trout fishing journey	Rex Hunt, Recreational Fishing Advocate
3.50 pm	Lure tossing in the South West rivers	Mark Gercovich, Fishing journalist and expert angler
4.05 pm	Feathers & flies – Tips from a trout fishing guide	Philip Weigall, Flystream.com
4.20 pm	Panel questions & answers	Delegates, speakers & chair

Conference wrap up

4.50 pm	What I got out of the conference	Tom Camp, Mornington Peninsula fly fishers (founding member)
5.00 pm	Close of conference	Travis Dowling

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Overview of Wild Trout Fisheries Management Plan

The **Wild Trout Fisheries Management Program** (Phase 1) was a collection of nine projects undertaken over three years that aimed to deliver:

- A clearer understanding of the cause(s) of the decline in wild trout fisheries,
- A better understanding of priority trout populations' health and status,
- Improved engagement with fishers to share our understanding of trout fisheries management, science and factors that drive the fishery,
- More responsive management of wild trout recreational fishing in Victoria, and
- Improved fishing opportunities for wild trout in Victoria.

Genesis of the Wild Trout Fisheries Management Plan

The summer of 2013-14 was an unhappy one for many of Victoria's trout stream anglers. Widespread reports of poor fishing were received from many normally productive wild trout streams.

In response, the Victorian Fisheries Authority commissioned Arthur Rylah Institute researchers to conduct population surveys of four trout rivers in North East Victoria during February 2014. These streams were selected to broadly represent those North East rivers where anglers reported poor angling catch rates. They included the King River (above and below Lake William Hovell), the Howqua River (upstream of Mansfield-Jamieson Road), the Jamieson River (upstream of Jamieson) and the Upper Goulburn River (Jamieson to Woods Point). The results suggested that trout populations in the lower reaches of these rivers were low in abundance. Trout populations at the higher elevations seemed unaffected.

The results of the survey were presented to:

- Representatives of trout fishing organisations at meetings on 3 April and 20 June 2014 held at Victorian Fisheries Authority's Snobs Creek Hatchery. This group of 12 agreed to act as a reference group to consider future research and development proposals.
- A public forum (attended by approximately 70 guests) held at Alzburg Resort, Mansfield on 10 April 2014.

A range of possible factors may have contributed to the trout population results observed. For example, one likely contributor to seasonally low trout abundances in the lower reaches of rivers in North East Victoria are high water temperatures associated with high ambient air temperatures and low summer river flows. Australia's mean temperature has been increasing since the 1980s and there are predictions that higher temperatures will occur more frequently in the future.

Trout are a cold water fish species and are physiologically vulnerable to warm water and impacts can be seen on distribution, feeding, growth, survival, reproduction and catchability by fishers.

A range of additional factors have also been suggested as contributing to low trout abundances in the lower reaches of North East Victorian rivers. These include stream habitat condition, fishing pressure, predation (e.g. cormorants) and competition with other species (e.g. carp).

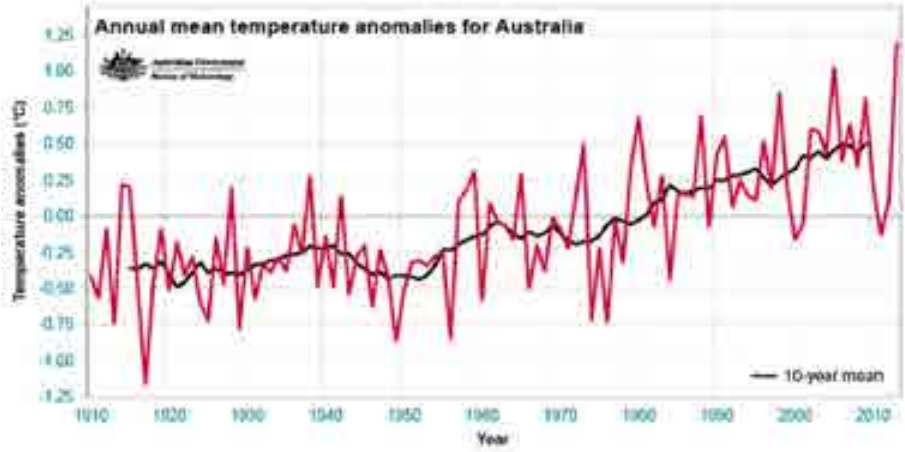

Figure 1: Annual mean temperature anomalies for Australia (compared with 1961–1990 average). Source: BOM 2014.

At both meetings, there was considerable discussion about what, if any, fisheries management interventions could be adopted to better understand how the fishery is performing and what could be done to improve it.

The high levels of angler concern about the status of river trout fishing in North East rivers and the social and economic contribution that trout fishing makes to the regional economy warranted further attention. The Victorian Fisheries Authority initiated a research and management program to address the key questions raised at the public meetings to better understand how the trout fishery is performing and what, if any, management interventions may be appropriate. Further details about the Wild Trout Fisheries Management Plan (WTFMP) are listed over page, throughout the proceedings and can be obtained from the website: www.depi.vic.gov.au/fishing-and-hunting/recreational-fishing/wild-trout-population-survey/wild-trout-fisheries-management-plan'

The Wild Trout Fisheries Management Program addressed the following key questions:

Are summer temperatures adversely impacting our river trout fisheries?

Trout are a cold water fish and high summer water temperatures can reduce feeding and increase mortality. A trout tracking study used acoustic tags and listening stations in the Delatite River to determine how river trout respond to changes in water temperatures to answer the questions like, if trout move when water temperatures increase, where do they go and at what temperature do they move?

Is there a decline in wild trout populations and breeding?

Wild trout populations in rivers rely on natural breeding to spawn young fish. Monitoring trout populations will help us assess annual breeding performance and predict the strength of the next year class of trout. This project conducted annual fish population surveys in up to twelve priority rivers annually (3–4 sites in each) to provide a 'report card'. This can be compared to historical trout population information in some of these rivers given substantial prior research in many Victorian waters. The project also considered whether predation and competition from other species was adversely affecting trout populations in rivers. During the survey work, scientists recorded information about carp, their size and abundance, along with other possible predators of trout such as cormorants.

Is fishing pressure adversely impacting trout populations and the quality of the trout fishery?

Excessive angler harvest of fish can impact trout populations by decreasing the number of reproductively mature fish. In turn, this can reduce the number of young fish produced in a system. Angler surveys and a 'tag return' program in the Howqua River helped us understand more about catch and harvest levels. It is prudent to regularly test catch limits, closed seasons and equipment restrictions to confirm they are still appropriate. The project looked for evidence that fishing pressure is impacting the fishery, and if there was need to reconsider fishing regulations including size and bag limits, the closed season or permitted equipment.

Are research results well understood by fishers?

Annual conferences with trout fishers and community groups help everyone stay informed about the progress and key outcomes of each project from the Wild Trout Fisheries Management Plan. Interested groups can thus better understand the factors at play and consider the best options for maintaining and improving our wild trout fisheries. The conferences provide an opportunity for fishers to hear about the very latest trout fishing developments, from local and international trout experts.

How can we reliably track changes in the angling performance of our trout fisheries?

There are many angling clubs that record their catches with great diligence. If this information can be shared for use in fisheries management, it may be a cost-effective way to get an indication of fishery performance over time and a means of assessing the impacts from interventions such as stocking and habitat restoration. A trial program using angling club records in fisheries monitoring was include the wild trout fisheries in Victoria.

Is reduced trout stocking into Lake Eildon impacting the trout fisheries in its inflowing rivers?

Fisheries managers are keen to better understand the contribution that trout stocking in Lake Eildon makes to the inflowing river trout populations. Similarly, to better understand the proportion of river fish which return to the lake for some period of their life stage. A study was done to determine more cost effective and accurate methods of marking stocked trout and in future allow a better understanding of the relationship between trout populations in Lake Eildon and its feeder rivers.

Have there been changes to bankside vegetation along our rivers? If so, have they affected water temperatures?

River water temperature is strongly influenced by the nature and extent of stream-side (riparian) shading. Major changes to bankside vegetation (e.g. bushfires and flooding, clearing and replanting) may adversely impact wild trout fisheries. This project investigated the changes to riparian shading and the scope to rehabilitate streamside vegetation if warranted.

Does trout stocking help wild brown trout river fisheries recover?

Past research on wild trout fisheries in Victoria and worldwide suggest stocking on top of existing self-sustaining populations is an ineffective strategy to improve the quality of fishing in the long-term. However anglers have a strong affinity with stocking and it's perceived benefits. This project trialed the stocking of two-rivers (Howqua and Upper Goulburn Rivers) with tagged trout to re-assess the effectiveness of this intervention to assist recovery and enhance wild trout fisheries.

Talk Wild Trout – four years on

Anthony Forster
Manager, Inland Fisheries, Victorian Fisheries Authority

The Wild Trout Fisheries Management Program brings together trout fishers and resource managers to share and transfer knowledge, build investment partnerships and, focus on what's important to get the best out of our wild trout fisheries (Victorian Fisheries Authority).

Talk Wild Trout 2018 marks the fourth Victorian Wild Trout Fisheries Management Program conference. This year's program builds on the results of the original Wild Trout Fisheries Management Program (2015, 2016 & 2017). Based on some great feedback, this program has now been extended for a further two years (2018 and 2019) with funding support from the Recreational Fishing License trust and our *Target One Million* Program.

We take this opportunity to thank the Mansfield Fly fishers for their tireless support and hosting of the Talk Wild Trout program at Mansfield for the first three years of the program. This year, our Trout Reference Group supported a change in conference venue to Preston, Melbourne to reach even more trout fishers.

It's my job at the start of each Talk Wild Trout conference, to recap on what we've learned to date from the program. This is meant to reflect, on and reinforce, some of the key findings to date. It's also about looking out the back window to see how far we've come on this journey.

In a snapshot, here are some our key achievements and discoveries we've collected along the way:

Communication and knowledge transfer

- Attracted more than 1000 trout fishers who attended Talk Wild Trout conferences,
- Built trust and partnerships between recreational fishers, Fisheries and Catchment Management Authorities,
- Established the Angler Riparian Partnerships Program ($1 million over three-years),
- Learned from (and adopted) leading international experts about best practice trout management,
- Established a new report card series to compare the performance of our wild trout fisheries,
- Hundreds of trout fishers now volunteering their time to restore river habitats and support trout research.

Research findings

- Surveyed and assessed the population health of 16 of our most iconic trout streams,
- Shown that yearling stocking of hatchery reared brown trout in rivers gives a poor return to anglers,
- Shown that large trout move upstream and seek shade to escape high water temperatures,
- Highlighted the important role that streamside vegetation plays in cooling water, providing trout refuge and trout food,
- Developed new chemical marking and genetic profiling technology to distinguish between wild and farmed trout,

- Shown trout fishing pressure and harvest rates are low in popular highland waters,
- Shown that brown trout populations can recover quickly when more favourable conditions return,
- Shown that trout are one of the most vulnerable fisheries to the effects of climate change,
- In hot summers, water temperatures in some of our iconic trout streams are lethal to trout,
- Well designed in-stream structure provides habitat complexity and boosts trout fishing.

Over the last four years, I've seen trout fishers rally behind this program and gain a deeper appreciation about what drives the performance of our wild trout fisheries. I've seen fishery managers and trout fishers working together (up to their waists), wading trout streams and installing trout incubator boxes. Hundreds of trout fishers have volunteered their time to brave the coldest of autumn mornings at Snobs Creek to fin clip thousands of trout and plant trees along their favourite trout streams.

More than this, we've worked closely with trout fishers to find common ground, found more resources to through partnerships and, built a strong foundation of trust.

This program has shaped my approach to trout fisheries management.

> *Environment conditions overwhelmingly drive the performance of our wild trout fisheries. Dynamic, often dramatic seasonal conditions expose our trout fisheries to challenges, most of which we can't control like; hot summers, low flows, increased water temperature, flooding and bushfires etc. In many ways we are bystanders to this natural and changing theatre. This has, and will continue to, impact trout abundance, their catchability and from time to time, result in poor fishing. Most trout fishers are in tune with these conditions and shape their fishing effort accordingly. In other words, they manage their fishing expectation.*

At its core, the Wild Trout Fisheries Management Program reflects the above but goes a step further. Asking the question, *what are the things we can do, or control, to maintain or improve our trout fisheries?*

Given our waterways are often highly modified, our key focuses has firmly settled on restoring fish habitat including; streamside vegetation shading and instream fish habitat. If we get this right, it will buffer trout fisheries against changing environmental conditions and, build resilience back into the fishery.

Four years on, through this program, we are now able to tackle these challenges, like never before.

Figure 1: The Wild Trout Fisheries Management Program has brought people together in genuine partnerships

Figure 2: "I've seen fishery managers and trout fishers working together (up to their waists), wading trout streams and installing trout incubators"

Trout Fishery Management and Challenges in Idaho

Jim Fredericks
Idaho Department of Fish and Game

Idaho is graced with 26,000 miles of streams and rivers, more than 3,000 natural lakes, and a quarter-million acres of ponds and reservoirs. Inhabiting those waters are 42 game fish species, including wild trout, giant white sturgeon, catfish, bass and ocean going salmon and steelhead. Not surprisingly, fishing is extremely important to Idaho, recreationally, culturally, and economically. Idaho's population is about 1.7 million people, with about 20% of the eligible population purchasing a fishing license. The recreation and tourism industry is the third largest in the state, and sport fishing comprises a substantial part of this business. Fishing in Idaho generates approximately $550,000,000 (US) in retail sales annually, with an additional $15,000,000 in sales for fishing licenses and permits.

Trout comprise the largest single component of the fishery. Multiple statewide angler opinion surveys dating back to 1967 consistently indicate trout are the most sought after fish in Idaho. Fishery managers are challenged with balancing sometimes competing demands of anglers for diverse fishing opportunities with the goal of protecting and conserving native species.

Trout species native to Idaho include the rainbow trout, three subspecies of cutthroat trout (westslope, Yellowstone, and Bonneville), and bull trout (a char). Though the Idaho Department of Fish and Game (IDFG) also manages very popular brook trout, brown trout, and lake trout fisheries, by policy native trout are a management priority. IDFG has progressively taken steps to conserve and manage native trout. Virtually all native trout populations have some kind of restrictive fishing rules to limit harvest. Proposed new species introductions are rigorously scrutinized to avoid potential impacts to native populations. Finally, where hatchery fish are stocked in waters supporting wild/native fish, stocked fish are treated to induce triploidy to render them sterile and unable to reproduce, thus maintaining the genetic integrity of native populations.

Though management programs emphasize maintenance of self-sustaining populations of trout over hatchery supplementation, hatcheries are still an important component of Idaho's fishery

Species	Percent of Anglers "Occasionally" or "Often" Targeting
Trout	94%
Anything that bites	73%
Bass	70%
Bluegill / Perch / Crappie	59%
Steelhead	46%
Kokanee	45%
Catfish / Bullhead	38%
Chinook Salmon	36%
Walleye	23%
Whitefish	19%
Northern Pike	15%
Carp / Sucker / Nongame	15%
White Sturgeon	15%
Tiger Muskellunge	7%

management programs. Hatchery trout, primarily rainbow trout, are used in reservoirs and streams where habitats are not capable of supporting natural production sufficient to meet angler demand. In total, approximately 10 million trout are stocked into Idaho waters each year. Hatchery trout stocking can generally be split into two categories. Put-and-take or "catchable" stocking is used where there is intensive angling pressure and long-term survival is not expected or needed. Because catchable stocking is relatively expensive, use is limited to waters where fish are easily available to anglers and likely to be caught. Put-and-grow stocking is used in more productive waters where long-term growth and survival are higher, making it a more economical strategy. This is generally limited to lakes and reservoirs. The majority of hatchery trout are stocked in lakes, reservoirs, and ponds. Stream stocking is limited to locations where there is high harvest demand and high returns on hatchery fish.

Idaho has a long history of being an "opportunity" state. Angler opinion surveys have clearly indicated that the vast majority of anglers prefer the use of restrictive length or bag limits over shortened seasons or area restrictions. Most lakes and reservoirs have been open to year-round fishing for several decades. More recently, recognizing the desire for increased opportunity in rivers and streams combined with a decreased demand for harvest, management direction in 2010 shifted largely toward year-round stream seasons across the state.

Diverse Challenges

Idaho is characterized by a great deal of geographic and hydrological diversity. For that reason, trout fisheries across the state are subject to vastly different limiting factors, and fishery managers face very different challenges. The northern and central regions of the state are characterized by higher precipitation rates, snowmelt driven systems, and lower productivity streams with lower densities and slower growth rates. Trout fishery management challenges include:

- Rain on snow events (winter/spring flooding)
- Overharvest
- Anthropogenic impacts of timber harvest, mining, and associated road construction

Management programs in the northern and central portions of the state are largely focused on restrictive wild trout harvest regulations while providing alternative harvest opportunities on hatchery stocked trout.

The eastern and southern regions of the state are characterized by lower precipitation rates and higher productivity streams, with greater trout densities and faster growth rates. Management challenges include:

- Drought
- Balancing native and non-native trout populations
- Anthropogenic impacts associated with grazing, irrigation demands (water diversions, water storage, and regulated stream flows)

Example of a rotating drum irrigation diversion screen

Management programs in the eastern and southern regions to benefit wild trout populations are largely focused on habitat restoration and working with water managers to improve stream flows at critical times of the year, restore connectivity, and minimize entrainment into irrigation ditches.

Other unique programs being implemented in regions of the state include avian predation management, identification and protection of cold water refugia, and, ironically, working with angler to encourage harvest of wild trout as a tool to conserve native trout populations.

Theme 1 - About the trout

The state of trout in Victoria: 2018 survey results

Brett Ingram[1] and Jason Lieschke[2]
[1]Victorian Fisheries Authority, [2]Arthur Rylah Institute , DELWP

Background

Trout populations can and do change and it is important to know if any change is within normal limits, or if it is not. The surveys were undertaken in response to angler concerns of poor trout fishing due to depressed trout populations in the 2013-14 summer. There was a need to investigate the trout populations to determine their status and to follow the populations to see if they were recovering or if they were depressed. Surveys were originally undertaken in 12 priority trout rivers but as the surveys showed trout recovery in most waters. The number of streams surveyed was slowly reduced to six. The focus of work has now shifted to where interventions are being undertaken, such as the Jordan Scotty incubator trials (described elsewhere in this document).

Surveys are an important management tool and sampling trout populations provides much information about the population health which is useful to both fisheries managers and fishers. By undertaking some simple measurements, the status of the population can be interpreted.

Counting the number of fish in a specified area provides an indication of abundance. Doing this over a several sites shows if there is any variation in fish numbers along the stream, and the information can also be compared to other sites or streams from different areas. Importantly, survey methods do not detect all fish in the system and are likely to underestimate the fish numbers.

Measuring fish gives an understanding of the size range and, the size that fish reach in the stream. By counting the number of fish at various lengths, we can see the small (young fish) and thus get a sense of recruitment and, of importance to anglers, get a sense of the proportion of small to large, catchable fish.

While the information from individual surveys can yield much information, repeating the sampling over several years provides even more. Comparing these things across years provides insights into the overall health of the populations.

What we did

Smaller streams were surveyed with a backpack electrofisher. Sampling methods were kept consistent across surveys so the results could be compared. Generally, this involved approximately 90 minutes of fishing and around 200 m of stream fished, but varied depending on stream conditions (width, depth, etc.). Larger sites that could not be waded were fished using an electrofishing boat for approximately 60 minutes. Some sites were fished with a combination of boat and backpack electrofishing, depending on site conditions.

All sites surveyed in wild trout program, plus historic sites in same areas. This represents 297 events from 1997 to 2018.

The results of these surveys were summarised and compared across the years with historical data from the sites going back to 1979.

What we found

Abundance

Abundance is a measure of the number of trout sampled from a given area. In this case we use trout per 100 m of stream as a standard measure. The abundance of trout sampled varied over the years. While this could reflect few sampling events in a year, generally chart (Figure 1) shows considerable variation in average abundance across the last several years. The long-term average can be used as a benchmark to assess how far away from the average the abundance ranged.

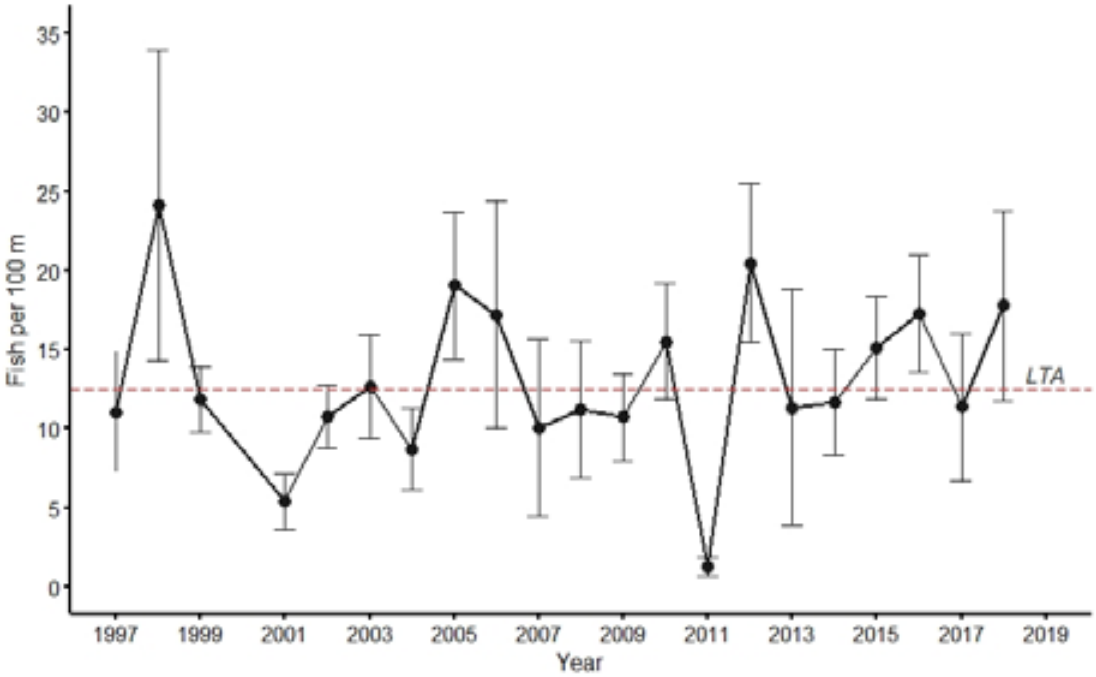

Figure 1 Abundance of trout from Victorian trout fishery from 1997 to 2019. ,Data pooled from all stream samples across several streams.

Size

Counting the number of fish in length categories provides an indication of the number of fish at particular sizes and indicates the range of sizes across the fishery. While the proportions of size of fish varies between streams, overall the Victorian brown trout fishery has few fish over 50 cm. Most fish are in the 20 cm range and although the numbers drop of, there are still there are numbers of fish out to 40 cm (Figure 2).

The rainbow trout fishery is smaller in number but similar to brown trout, has many fish around the 20 cm length (Figure 3). The rainbow trout do not grow as big as the brown trout with few fish longer than 35 cms.

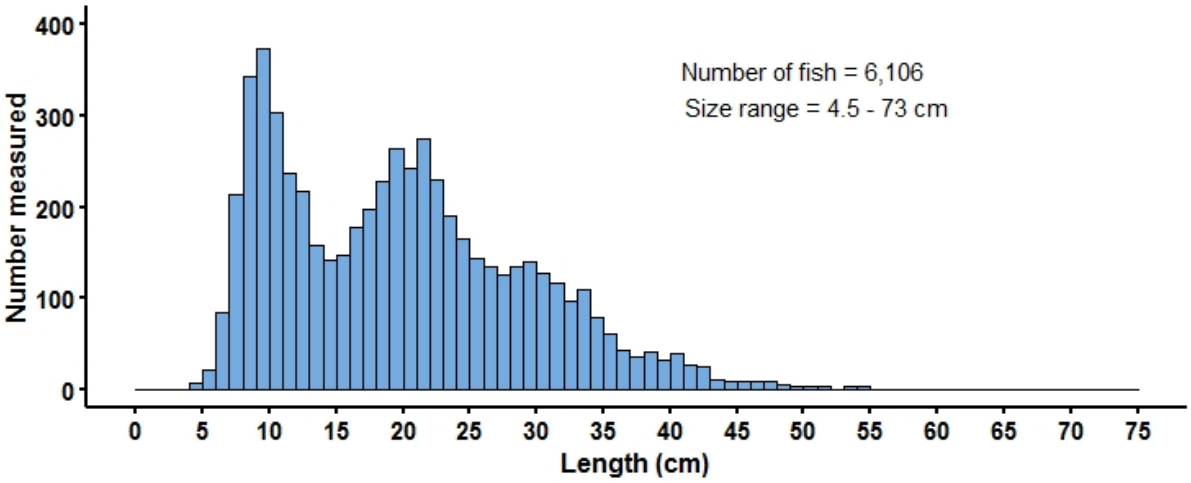

Figure 2 Brown trout length frequency all sampled fish combined

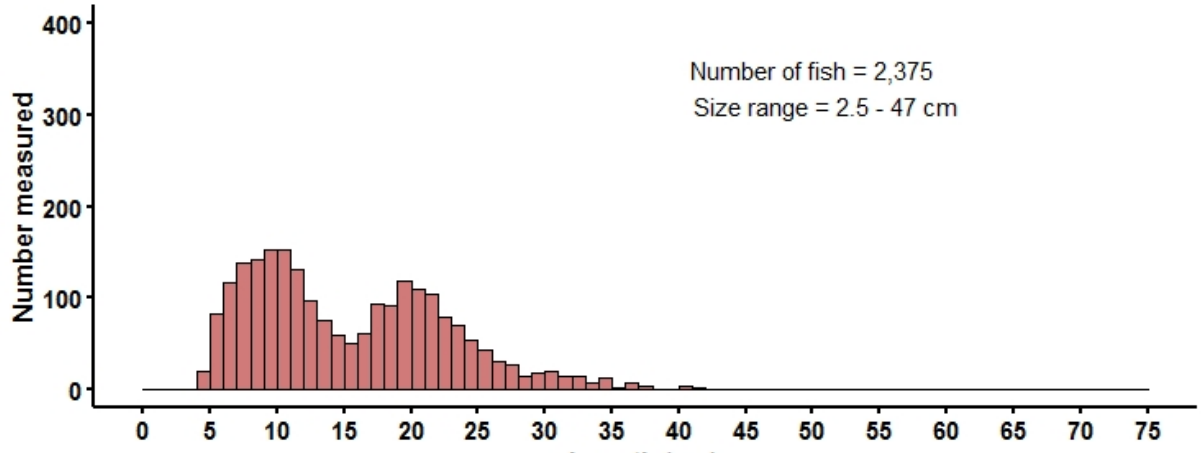

Figure 3 Rainbow trout length frequency all sampled fish combined

Recovery

Trout populations vary and numbers can be reduced but the populations recover. The abundance chart (Figure 1) shows the variation of the overall the fishery and highlights the trout fishery recovery from times of lower abundances. Sometimes this was over two years (see 2001 in Figure 1) but large recovery can occur within one year (see 2011 in Figure 1).

If we looked at the length frequency charts for specific streams over time the recovery can be clearly seen. Figure 4 and Figure 5 show the length frequencies of brown trout and rainbow trout each year between 2014 and 2018. The year 2014 was when the concerns over the Victorian trout fishery were being raised. The low numbers and lack of small fish indicates low or no recruitment. This is evident in both charts in 2014. However, by 2015 there are signs of recruitment (note the peak of small fish in the 5-10 cm size range on both charts. The variation I the populations within each stream is also shown in these charts.

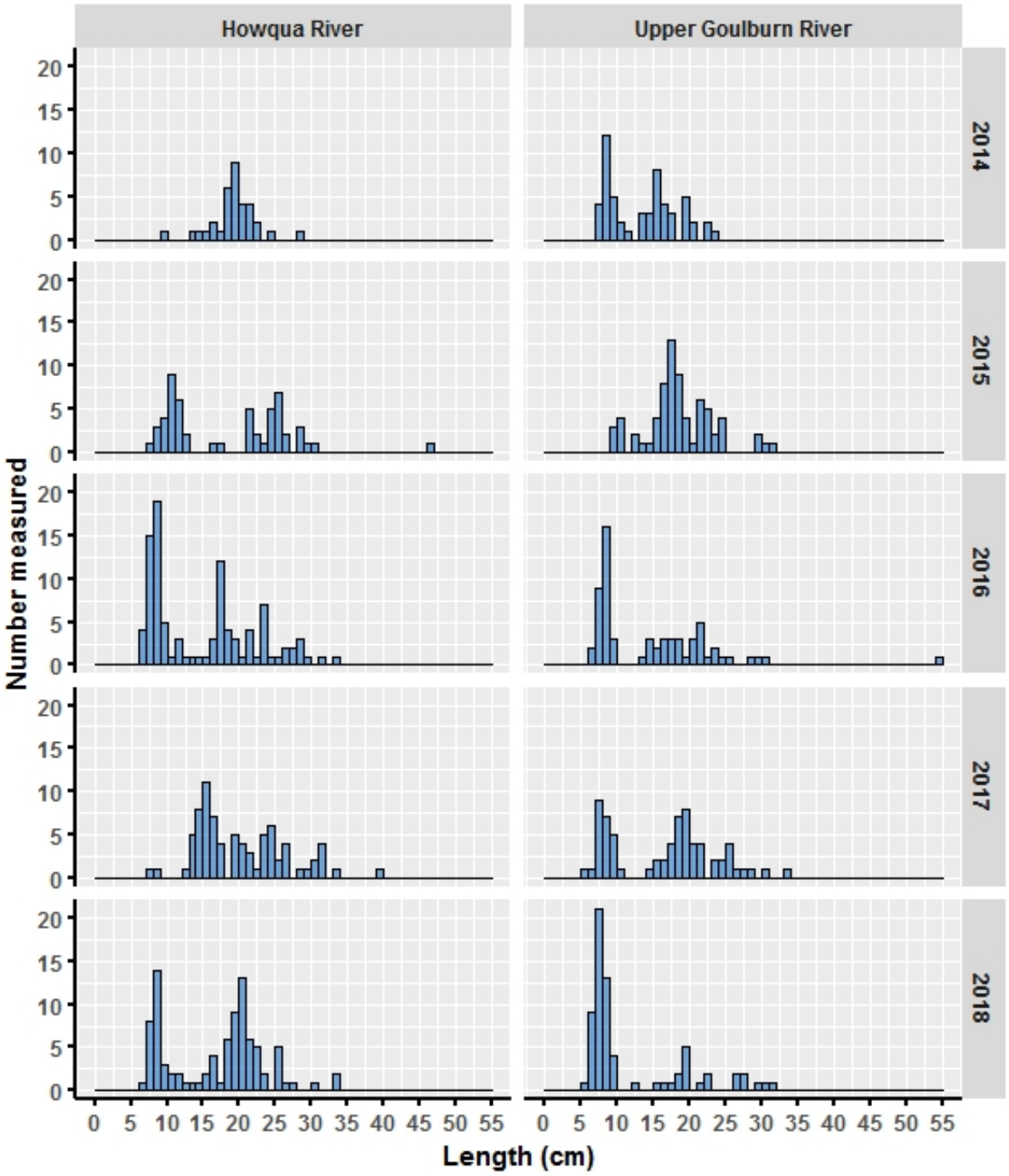

Figure 4 Brown trout length frequency for selected years for Howqua River and upper Goulburn River

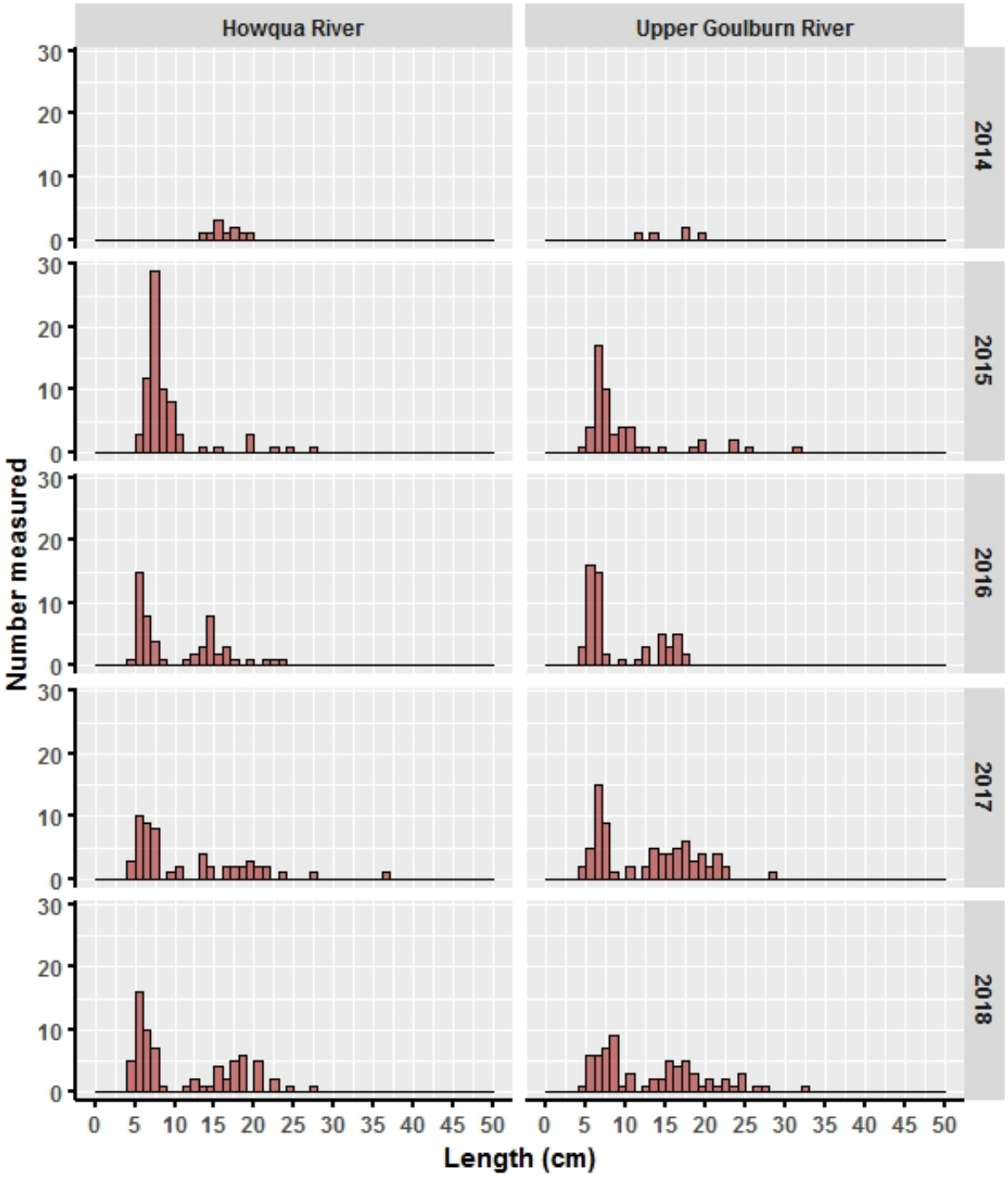

Figure 5 Rainbow trout length frequency for selected years for Howqua River and upper Goulburn River

What we learned

The surveys undertaken for the Wild Trout Fisheries Management Program highlight the size range of trout likely to be encounter by anglers. The results indicate that while most fish encountered will be around 25 cms or so, there are still some better fish in some streams.

The Victorian wild trout fishery is not a trophy fishery but provides numbers of fish within the 20 to 40 cm size range. Most of the wild trout streams are not large and fish of this size provide plenty of sport to anglers fishing these wild streams.

While there is variation in trout abundance, there are still generally fish in the streams. The Victorian trout fishery is very resilience and the populations have shown their capability of quickly recovering after adverse events. While there can be considerable variation in trout abundance from season to season, there are enduring populations of trout in all streams surveyed.

The overall learning is that the wild populations may fluctuate but can recover given suitable environmental conditions.

Where to now?

Over the last three years the general stream monitoring has been slowly reduced from the original 12 priority streams as it became clear that trout populations varied, and that the populations in these streams had recovered in most areas from 2013-4.

The Wild Trout Fisheries Management Program surveys highlighted the resilience of wild trout populations and the capability of populations to quickly recover. These learnings highlight the importance of habitat to not only provide protection and feeding opportunities in stream, but as a means of mitigating the adverse impacts of low flows and warming waters through shading and creation of depth etc to assist the wild populations.

Health cards for six wild trout streams 2018

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Aim:

Produce health cards for each of our monitored streams to give fishers and managers a better understanding of the past and current health of our wild trout streams.

Overview:

The information in these *Health cards* is aimed to give the reader a better understanding of the health of trout streams now and into the future. It is hoped the health cards will also provide some information useful for your future trout fishing adventures. These *Health cards* add to those for selected trout streams published in 2015, 2016 and 2017 (Hunt and Lieschke 2015, Hunt and Lieschke 2016, Ingram *et al.* 2017).

The information provided on the *Health cards* is based on recent and past survey information collected using electro-fishing methods. Electro-fishing is an effective sampling tool for providing a snapshot of the presence and abundance of fish present in a stream. However, electro-fishing is not perfect and does not catch all the fish present. For example, some studies suggest electro-fishing catches around 28% of trout present at a site, and not all habitat is fished (or fishable), particularly in larger streams, such as the Goulburn River tailrace. Often fish are observed but cannot be caught. Therefore, the numbers of fish presented in the *Health cards* should be considered an underestimate. ***There are likely to be many more fish in the system available to fishers, than just those recorded in the surveys!***

It is also important to remember that trout populations vary widely and trout are a resilient species. Some streams support large populations and others support small populations, depending on the carry capacity of the stream. Some streams have lots of small fish and others have few big fish. Streams that fished poorly last year may fish well the next season, or vice versa. Fluctuation is normal in fish populations and trout are particularly good at responding to their environment. These *Health cards* provide a snapshot insight into the current health of a variety of trout populations in Victoria.

What we did:

Between mid-January and early February 2018, six trout streams (Table 1, Figure 1) were surveyed using electro-fishing (Figure 2). Three to four sites were surveyed in each stream, and 60 - 360 m of stream was surveyed at each site (355 – 920 m per stream). The length of trout caught were measured and their abundance (number of trout caught per 100 m of stream) was estimated. These results were compared with surveys conducted in previous years as part of the *Wild Trout Fisheries Management Program* (Hunt and Lieschke 2015, Hunt and Lieschke 2016, Ingram *et al.* 2017) (Appendix I), and historic electro-fishing surveys of the streams conducted by fisheries scientists This information was then summarised into a *Health card* for each stream, and key health indicators assessed.

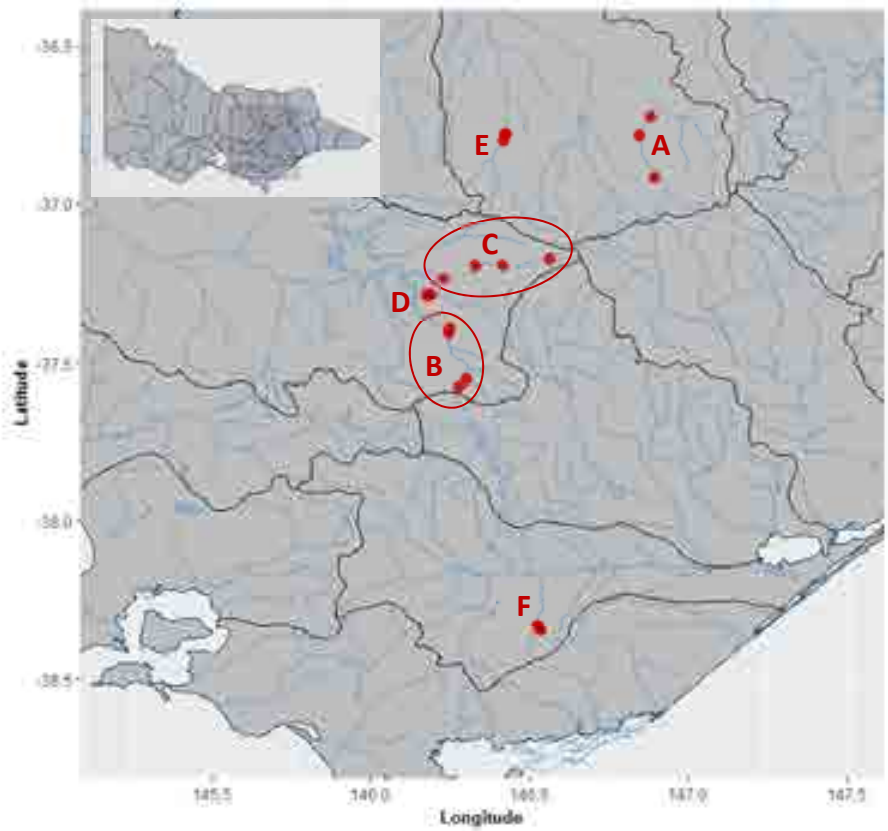


Figure 1. Location of streams surveyed in 2018. A. Buckland River, B. Upper Goulburn River, C. Howqua River, D. Jamieson River, E. King River system, F. Traralgon Creek.

Figure 2. Electro-fishing in the Buckland River (left) and measuring fish that were caught (right)

How to read the *Health cards*:

The green **Key Health Indicators** box provides an easy to read overall evaluation of key health attributes of the trout population in the stream and an overall rating, which are:

Abundance (fish/100 m)	⇧	Up compared to historic records collected over at least three years.
	⇩	Down compared to historic records collected over at least three years.
	⇔	Stable compared to historic records collected over at least three years.
	?	Insufficient information.
Recent recruitment	✓	Good numbers of small trout < 12 cm (5 inches)[1] present, indicating that trout have spawned recently (last 12 months) (or that a stocking event has recently occurred).
	Some	Some small trout < 12 cm (5 inches) present.
	✘	No small trout present
Multiple size classes	✓	Wide range of fish sizes present indicating multiple year classes present in the stream.
	Some	Some size classes present.
	✘	Very few size classes present.
Mature fish	✓	Trout > 30 cm (12 inches)[2] present, indicating mature fish capable of spawning are present in the stream.
	Some	Some trout > 30 cm (12 inches) present.
	✘	No trout > 30 cm (12 inches) present.
Overall rating		**Low** **Moderate** **Good** **Very good** **Excellent**

1. Indicative size only as growth of juvenile trout may vary between streams and years.
2. Indicative size only as size at maturity varies between species, streams and years.

The pink **Monitoring Results** section provides a summary the fish surveys conducted in the stream, including the number of brown trout and rainbow trout caught and their abundance (fish per 100 m), the size of the largest trout caught, the percentage of trout that were over 20 cm in length (defined as catchable), and the abundance and average size of trout over 20 cm in length. All abundance estimates for current and historic data are derived from fish caught only, and excludes fish that were observed but not caught.

The map shows the locations of each survey site and abundance of trout sampled at each survey site.

The second page of the card provides important information about the shape of the population (size structure) of the trout population in the stream and the relative abundance (fish per 100 m) compared with previous surveys. The size range of trout caught in 2018 is presented as a graph of the number of fish caught for different size (length) categories. The abundance of trout caught is graphed along with abundance estimates from surveys conducted in the same stream in previous years. In addition, the long-term average (*LTA*) abundance for both brown trout (*LTA-BT*) and rainbow trout (*LTA-RT*), which were calculated by determining the average abundance from all available records (current and historic) for the stream, are presented on the abundance graph.

Information is also presented on recent stocking events in the streams surveyed. Finally, a simple overview summary statement of the *Health card* report is provided.

What we found:

A total of 369 brown trout and 234 rainbow trout were caught during surveys of 6 wild trout streams.

A summary of the key health indicators for the 6 wild trout streams surveyed in 2018 and overall ratings for these streams from earlier surveys are provided in Table 1. In 2018, two streams (upper Goulburn River and Howqua river) had an overall rating of Excellent. The Howqua river continues to be a high rating stream as in previous years it was rated as either Very Good or Excellent. In previous years the upper Goulburn River was rated as either Moderate or Good.

Trout abundance

A summary of trout abundance records for all sites surveyed in streams as part of the *Wild Trout Fisheries Management Program* (2015-2018), along with historic records back to 1997 for these streams, is presented in Appendix II. Abundances range from <1 trout/100m to 130 trout/100m, with few records (20%) being >20 trout/100m. Abundance estimates for surveys conducted in 2018 are provided in Figure 3.

The streams surveyed in 2018 supported moderate to excellent populations of trout. Trout abundance estimates were generally up compared to historic records for the Buckland River, upper Goulburn River, Howqua River and the King River system (below Lake William Hovell) (Table 1). In all streams, except for Traralgon Creek where there were insufficient historic records, trout abundance in 2018 was general higher than long-term average (LTA) values for brown trout and rainbow trout.

Brown trout were caught in all streams surveyed in 2018. No rainbow trout were caught in the King River system (below Lake William Hovell) and Traralgon Creek. Abundance estimates of brown trout were higher than those for rainbow trout in most streams, the exceptions being the Howqua and Jamieson rivers. The highest brown trout abundance was recorded in the Buckland River (23.5 fish per 100 m) where many small fish (< 10 cm) were caught (Figure 3). The highest rainbow trout abundance was recorded in the Howqua River (15 fish per 100 m) (Figure 3).

Trout size range

The size (length) of brown trout and rainbow trout caught during surveys conducted in 2018 is provided in Figure 4

The highest average length of brown trout was observed in the Howqua River (17 cm, 7 inches), followed by the Buckland and Jamieson rivers (13 cm, 5 inches) (Figure 4). The largest brown trout measured (54 cm, 21 inches) was caught in the Buckland River. The highest average length of rainbow trout was observed in the Buckland River (15 cm, 6 inches), followed by the upper Goulburn River (13 cm, 5 inches) (Figure 4), and the largest measured (33 cm, 13 inches) was also from in the upper Goulburn River (Figure 4).

Size range of brown trout and rainbow trout surveyed in 2018 is presented in Appendix III.

Length weight relationships for brown trout and rainbow trout are provided in Appendix IV.

Table 1. Summary of key health indicators for six wild trout streams surveyed in 2018, and overall ratings for these streams from 2017, 2016 and 2015 surveys.

Stream	2018 Results					2017	2016	2015
	Abundance	Recent recruitment	Multiple year classes	Mature fish	Overall rating	Overall rating	Overall rating	Overall rating
Buckland River	⇧	✓	✓	✓	Very good	Not surveyed	Not surveyed	Not surveyed
Upper Goulburn River	⇧	✓	✓	✓	Excellent	Good	Moderate	Good
Howqua River	⇧	✓	✓	✓	Excellent	Excellent	Excellent	Very good
Jamieson River	⇔	✓	**Some**	**Some**	Good	Good	Low	Moderate
King River system	⇧	✓	✓	✓	Very good	Not surveyed	NA*	NA*
Traralgon Creek	**?**	✓	✓	**Some**	Good	Excellent	Not surveyed	Not surveyed

* NA. Not applicable because different areas and sites were surveyed.

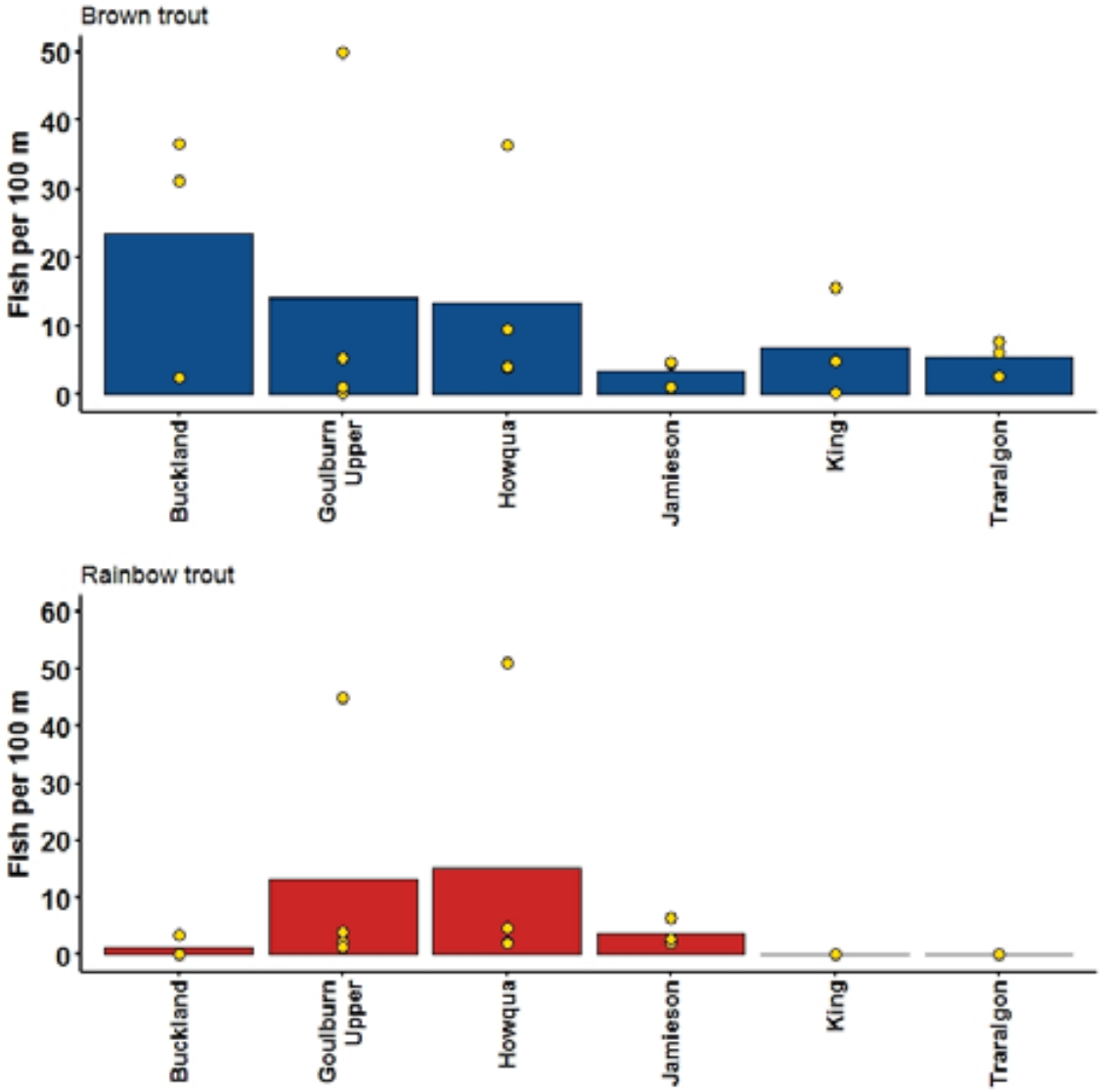


Figure 3. Abundance estimates of brown trout (upper) and rainbow trout (lower) caught during surveys of 6 wild trout streams. (Bars = average values. Dots = estimates for each site surveyed in each stream).

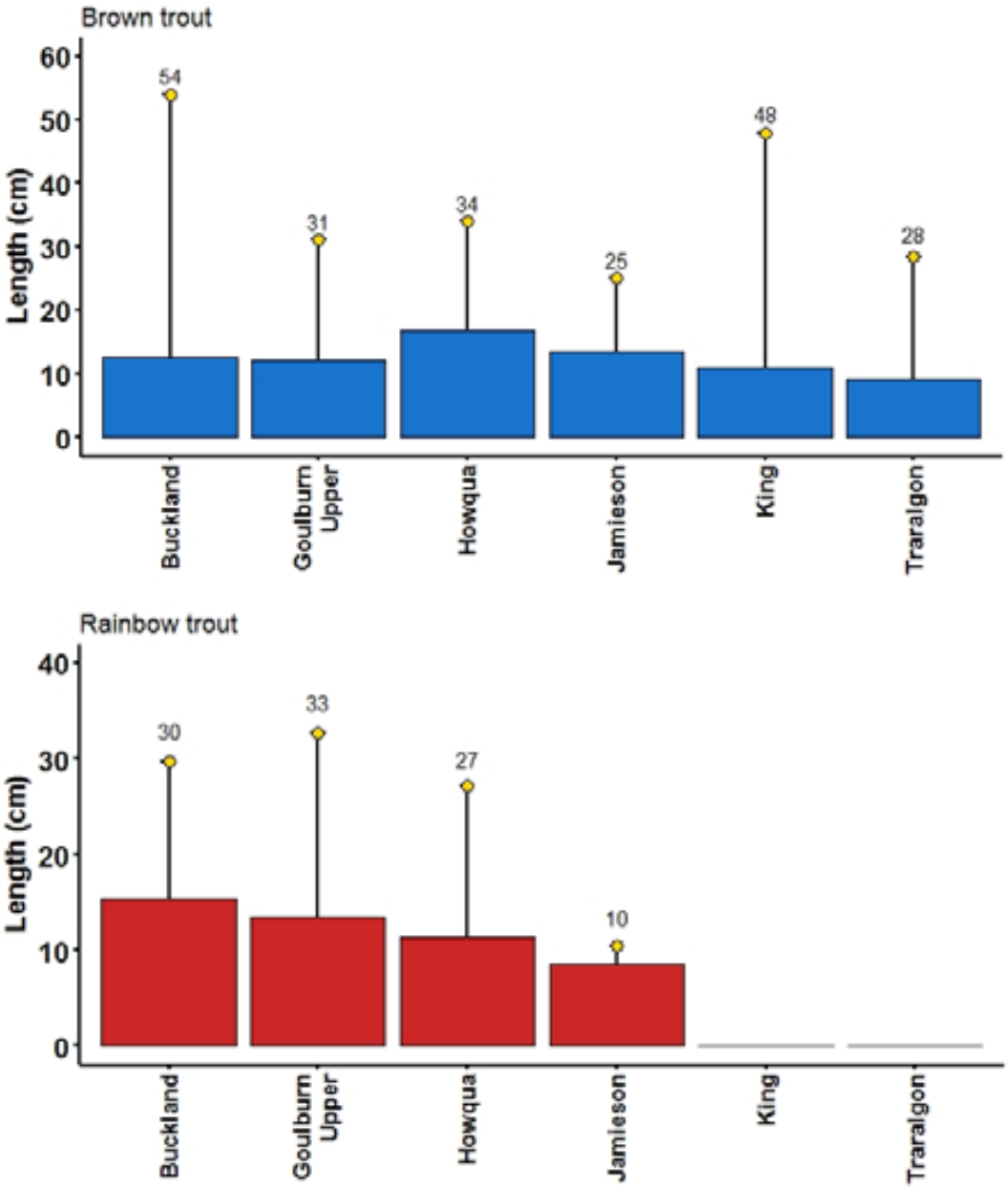


Figure 4. Length of brown trout (upper) and rainbow trout (lower) caught during surveys of 6 wild trout streams. (Bars = average values. Dots = Maximum length measured).

References:

Hunt, T. and Lieschke, J. (2015). Health cards for 12 of our best wild trout streams. In: *Talk Wild trout 2015: Conference Proceedings* (Hunt, T., Douglas, J. and Forster, A. eds.), pp. 14-38. Fisheries Victoria, Department of Economic Development Jobs Transport and Resources, Queenscliff.

Hunt, T. and Lieschke, J. (2016). Health cards for 12 of our best wild trout streams 2016. In: *Talk Wild trout 2016: Conference Proceedings* (Hunt, T., Douglas, J. and Forster, A. eds.), pp. 17-41. Fisheries Victoria, Department of Economic Development Jobs Transport and Resources, Queenscliff.

Ingram, B.A., Hunt, T. and Lieschke, J. (2017). Health cards for 10 wild trout streams 2017. Pp. 19-47. In: *Talk Wild Trout 2017: Conference Proceedings (Mansfield, 11 Nov. 2017)*. Victorian Fisheries Authority, Melbourne.

Location: Buckland River

Surveyed: 23 January 2018

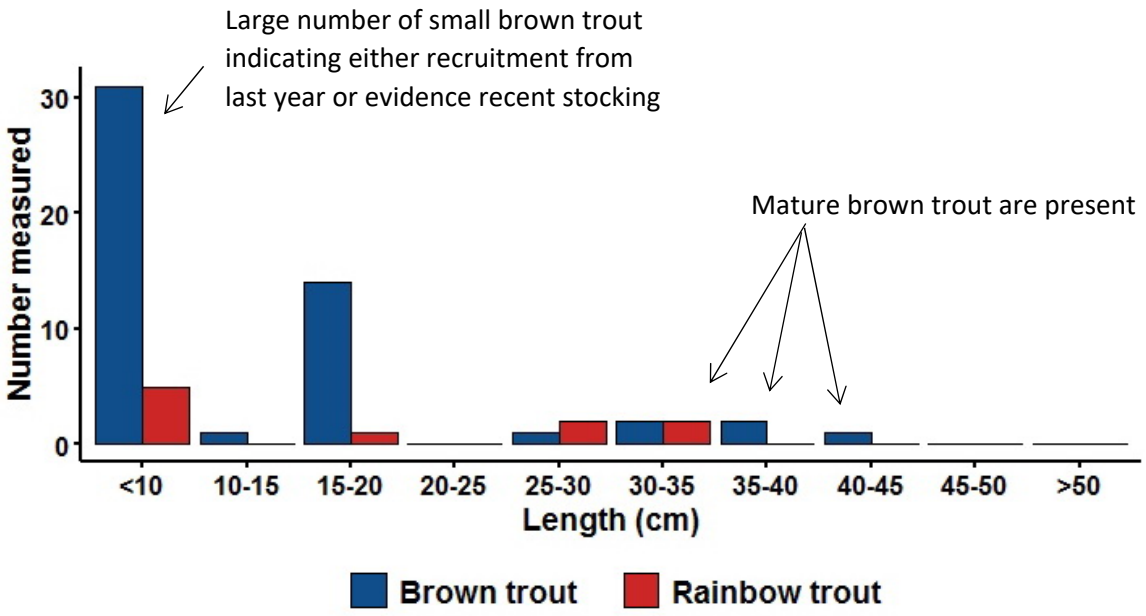
Site A: Buckland River Road (290 m stretch)
Site B: Swamp wallaby trail (80 m stretch)
Site C: Harris Lane (60 m stretch)

Key health indicators

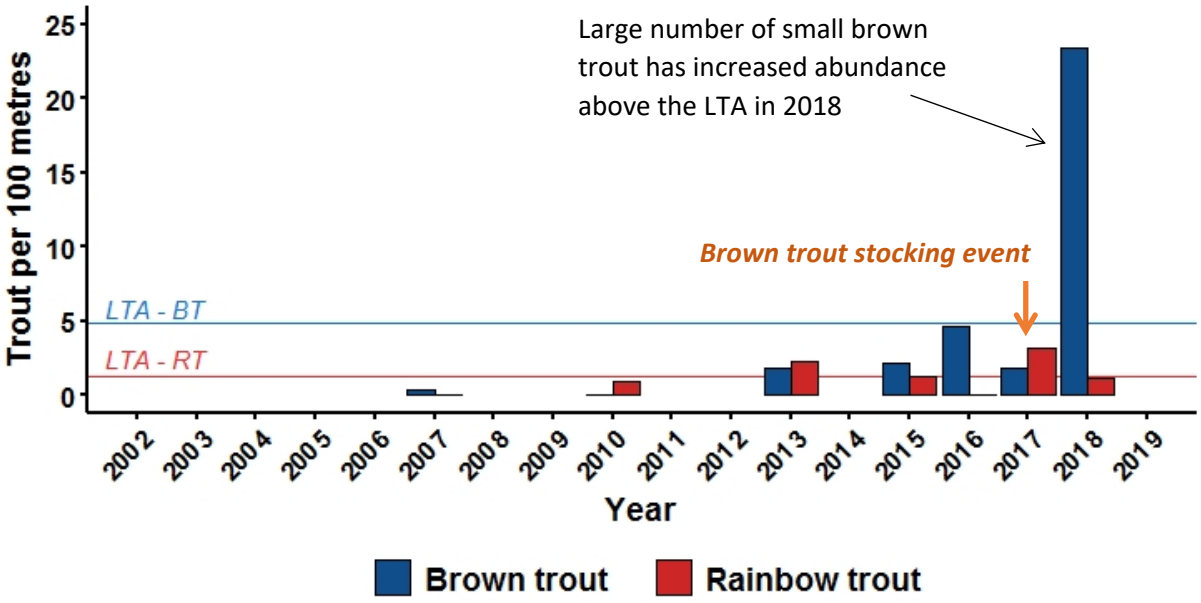
Abundance	⇧
Recent recruitment	✓
Multiple size classes	✓
Mature fish	✓
Overall rating	Very good

Monitoring results		Brown trout	Rainbow trout	ALL TROUT
Total number of fish caught in 430 m of river		54	10	64
Mean fish abundance (fish per 100 m)		23.5	1.2	24.6
Largest fish	Weight	2 kg (4.3 lb)	0.3 kg (0.7 lb)	2 kg (4.3 lb)
	Length	54 cm (21 “)	30 cm (11.5 “)	54 cm (21 “)
% of catchable (20 cm +) fish		13 %	40 %	17 %
Average size of catchable fish (20 cm +)		33 cm (13 “)	25 cm (10 “)	30 cm (12 “)
Abundance of catchable fish per 100 m		3	0.5	3.5
Other species present:	2-spined blackfish, galaxiid minnows and Murray spiny crayfish			

Buckland River trout size range in 2018



Buckland River abundance



The 2018 survey suggests the Buckland River supports very good numbers brown trout (mainly juveniles) and moderate numbers rainbow trout. There is many juvenile brown trout, indicting either recruitment from last year's spawnings or evidence recent stocking. This has increased the abundance of brown trout in 2018 above the long-term average (LTM).

Location: Upper Goulburn River (above Lake Eildon)

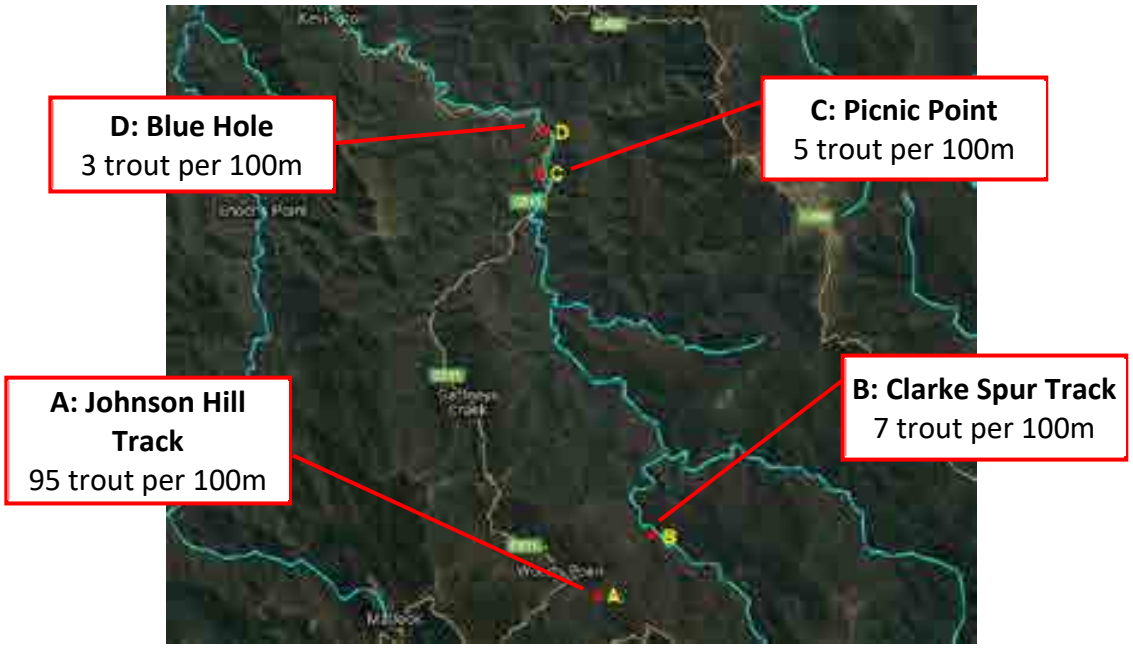
Surveyed: 22 Jan. - 2 Feb. 2018

Site A: Johnson Hill Track on the Upper Goulburn River (160 m stretch)
Site B: Clarke Spur Track on the Upper Goulburn River (260 m stretch)
Site C: Picnic Point on the Upper Goulburn River (200 m stretch)
Site D: Blue Hole on the Upper Goulburn River (300 m stretch)

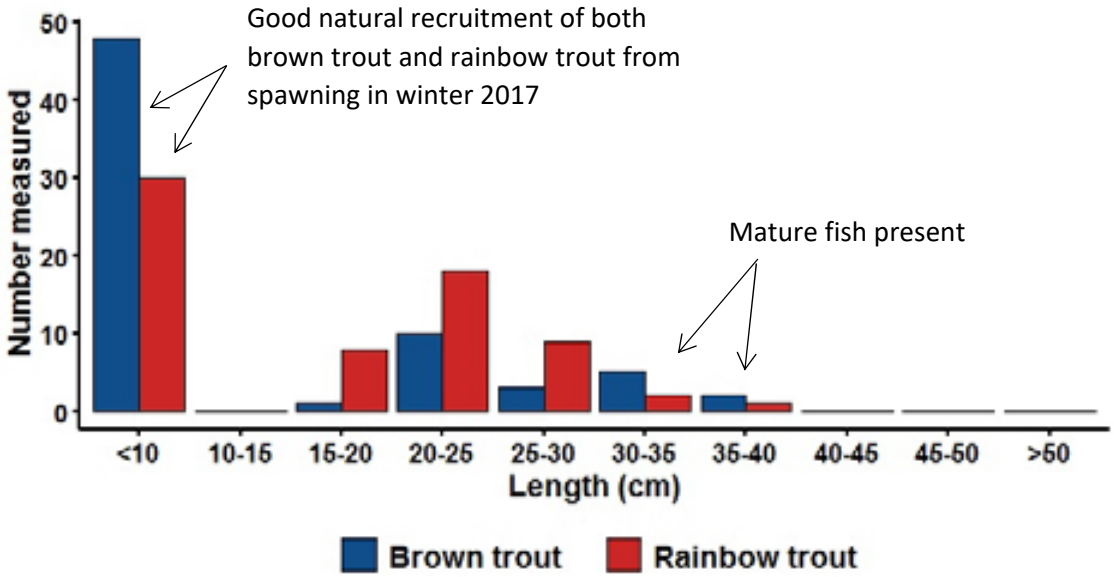
Key health indicators

Abundance	⇧
Recent recruitment	✓
Multiple size classes	✓
Mature fish	✓
Overall rating	Excellent

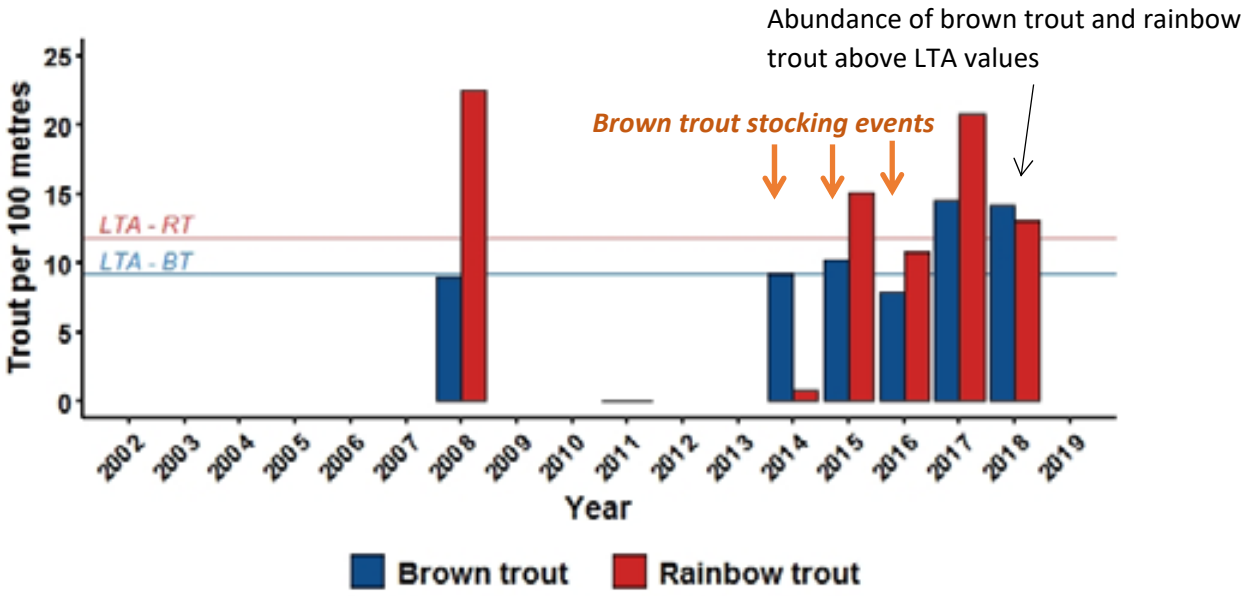
Monitoring results		Brown trout	Rainbow trout	ALL TROUT
Total number of fish caught in 920 m of river		97	90	187
Mean fish abundance (fish per 100 m)		14	13	27
Largest fish	Weight	0.4 kg (0.9 lb)	0.3 kg (0.7 lb)	0.4 kg (0.9 lb)
	Length	31 cm (12 “)	33 cm (13 “)	33 cm (13 “)
% of catchable (20 cm +) fish		14 %	17 %	15 %
Average size of catchable fish (20 cm +)		27 cm (10.5 “)	24 cm (9.5 “)	25 cm (10 “)
Abundance of catchable fish per 100 m		2	2.2	4.2
Other species present:	2-spined blackfish, common carp, galaxiid minnows, Murray spiny crayfish and redfin perch			



Upper Goulburn River size range in 2018



Upper Goulburn River abundance



The 2018 survey suggests the upper Goulburn River supports good numbers of medium sized brown trout and rainbow trout, and there is good evidence of recent natural recruitment. Trout abundance is above long-term average values.

Location: Howqua River

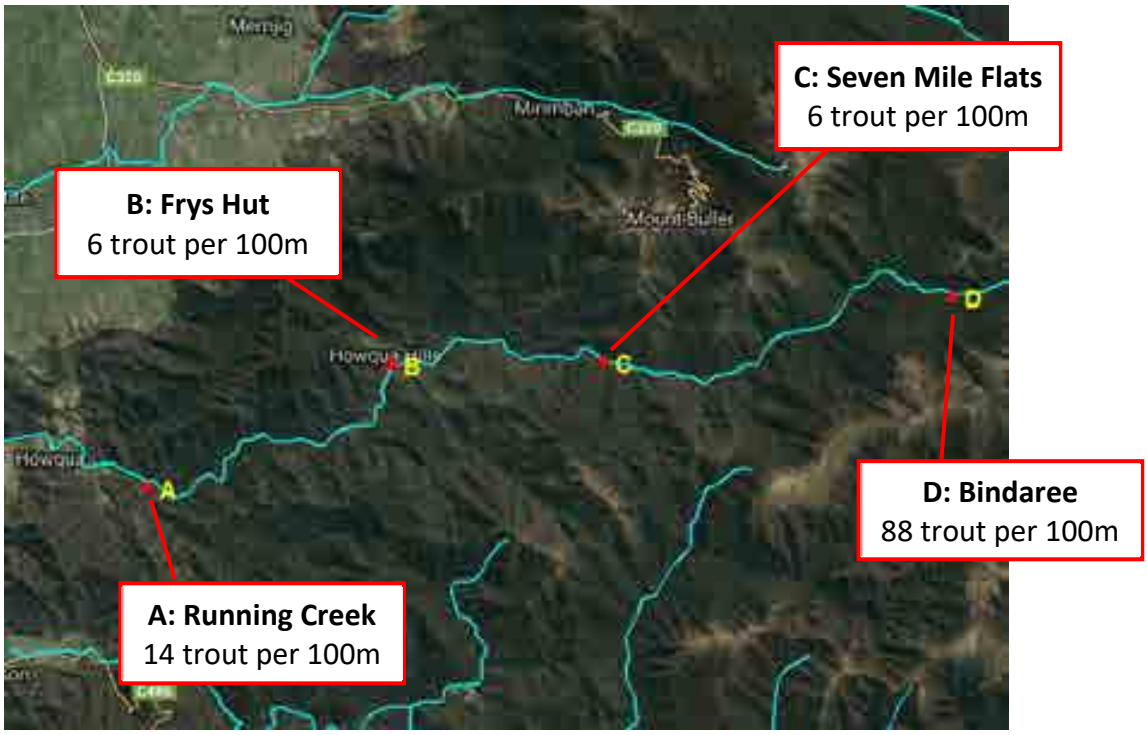
Surveyed: 22 Jan. – 1 Feb. 2018

Site A: Running Creek (230 m stretch)
Site B: Frys Hut on the Howqua River (180 m stretch)
Site C: Seven Mile Flats on the Howqua River (200 m stretch)
Site D: Bindaree on the Howqua River (200 m stretch)

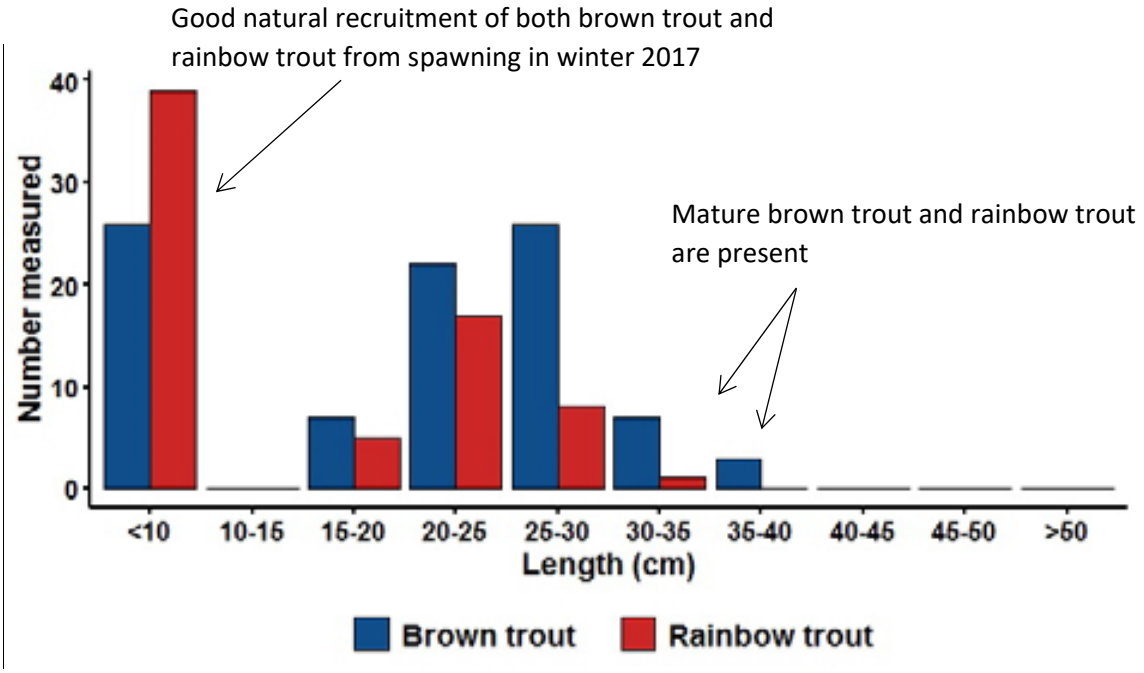
Key health indicators

Abundance	⇧
Recent recruitment	✓
Multiple size classes	✓
Mature fish	✓
Overall rating	**Excellent**

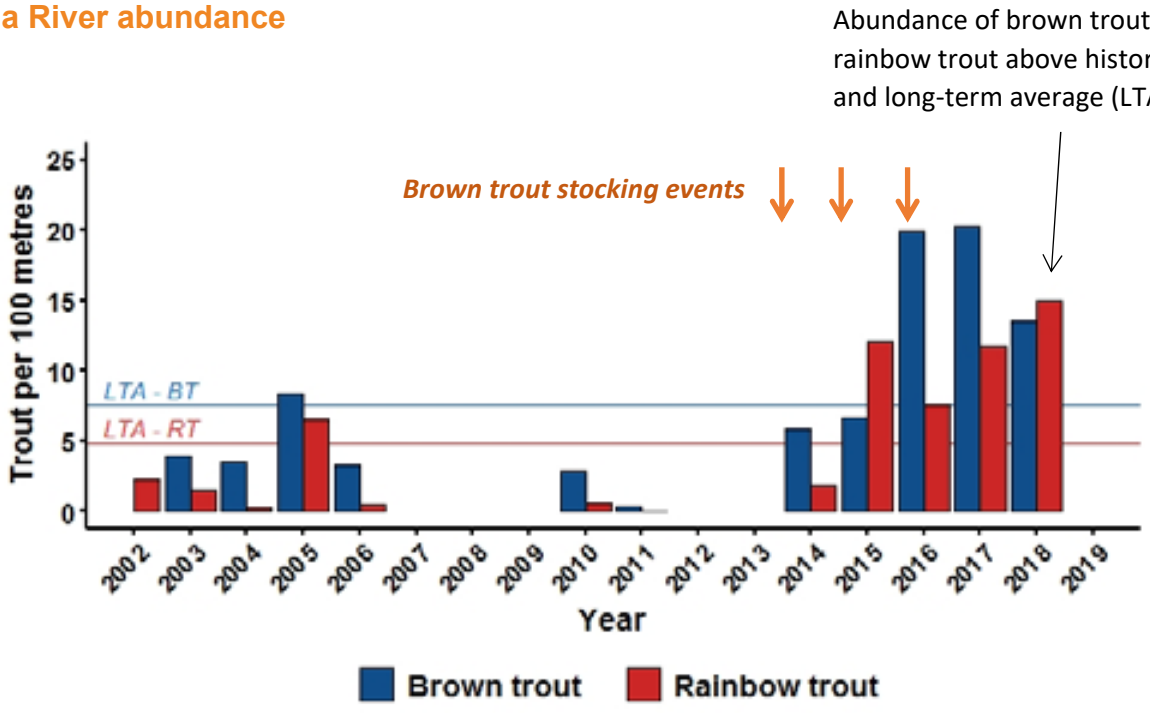
Monitoring results		Brown trout	Rainbow trout	ALL TROUT
Total number of fish caught in 810 m of river		110	121	231
Mean fish abundance (fish per 100 m)		13.5	15	28.5
Largest fish	Weight	0.7 kg (1.6 lb)	0.2 kg (0.5 lb)	0.7 kg (1.6 lb)
	Length	34 cm (13.5 “)	27 cm (11 “)	34 cm (13.5 “)
% of catchable (20 cm +) fish		37 %	12 %	26 %
Average size of catchable fish (20 cm +)		23 cm (9 “)	22 cm (9 “)	23 cm (9 “)
Abundance of catchable fish per 100 m		5	1.8	6.8
Other species present:	2-spined blackfish, common carp, galaxiid minnows, Murray spiny crayfish, redfin perch, roach and yabbies			



Howqua River size range in 2018



Howqua River abundance



The 2018 survey suggests the Howqua River continues to support good numbers of small and medium sized brown trout and rainbow trout. Abundance of trout is above historic records and long-term average (LTA) values. There is good evidence of recent natural recruitment, and mature fish capable of spawning are present.

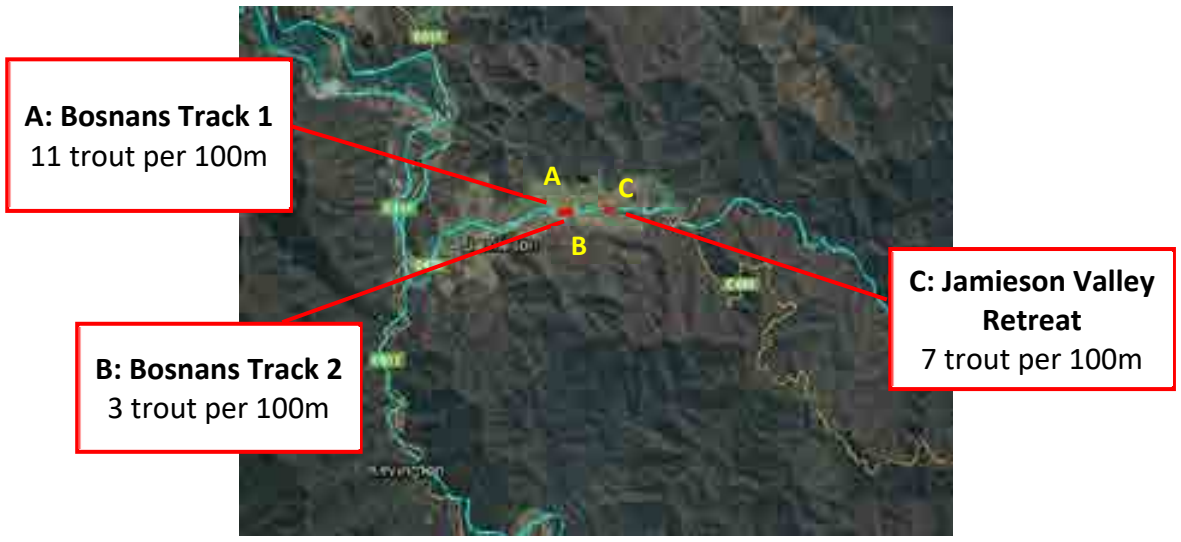
Location: Jamieson River

Surveyed: 25 Jan. 2018

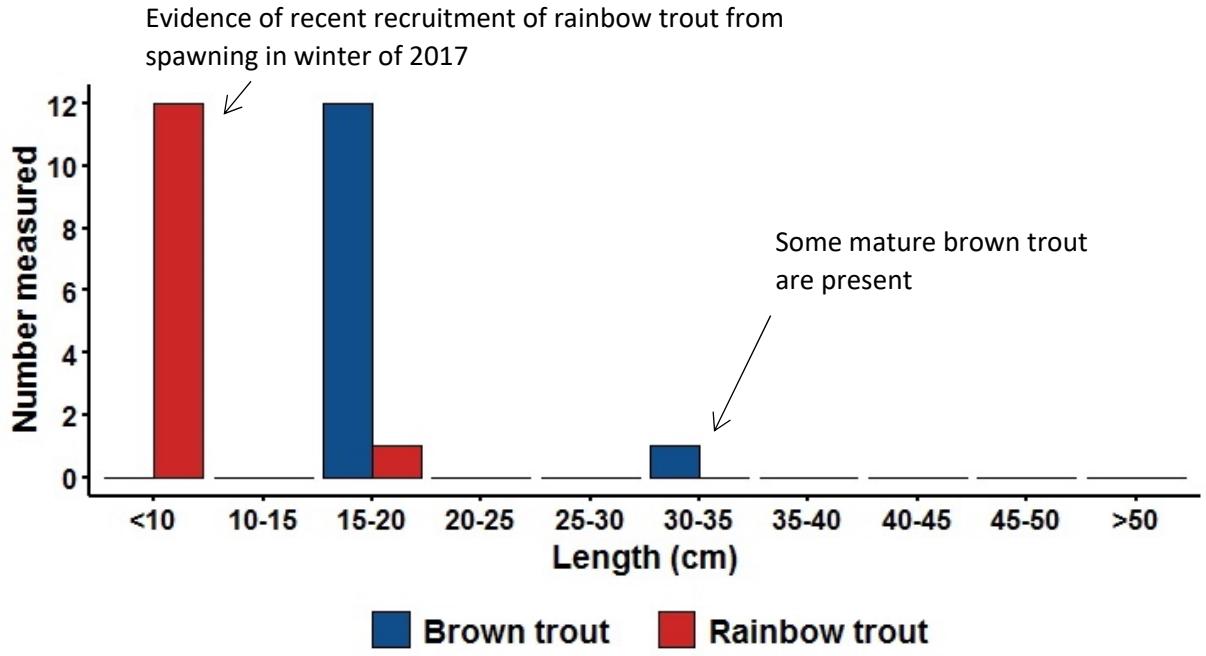
Site A: Bosnans Track Site 1 (110 m stretch)
Site B: Bosnans Track Site 2 (95 m stretch)
Site C: Jamieson Valley Retreat (150 m stretch)

Key health indicators	
Abundance	⇔
Recent recruitment	✓
Multiple size classes	Some
Mature fish	Some
Overall rating	Good

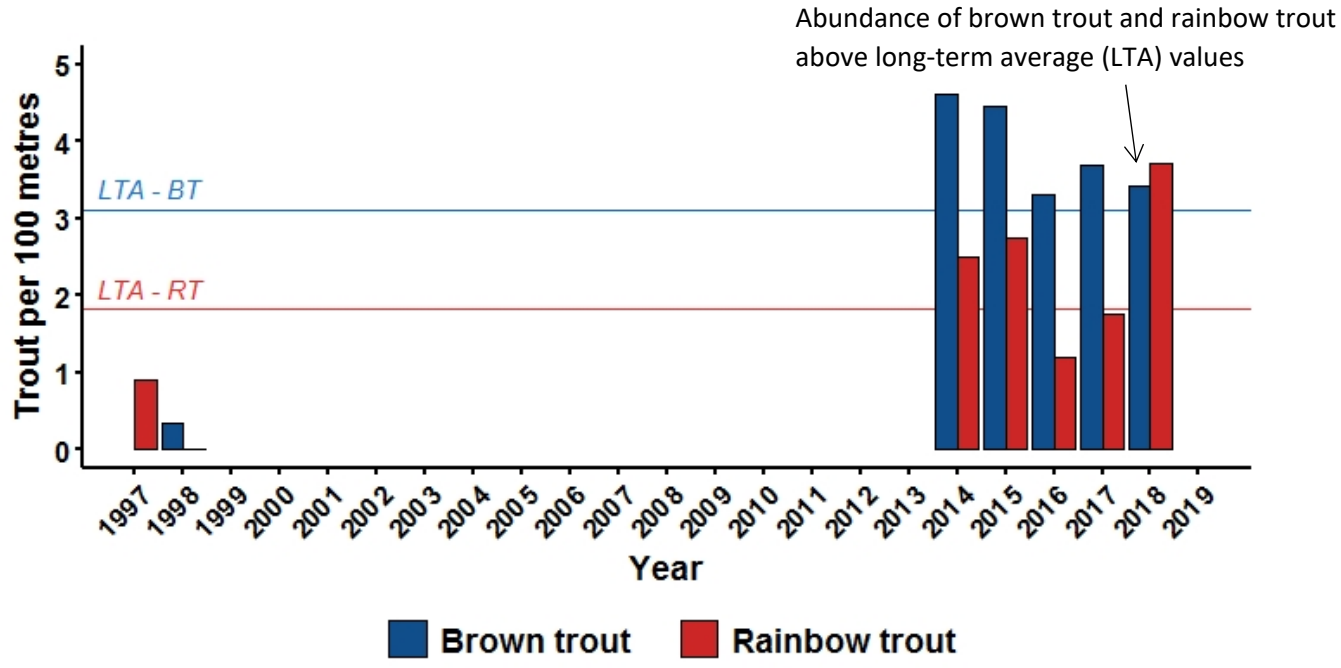
Monitoring results		Brown trout	Rainbow trout	ALL TROUT
Total number of fish caught in 355 m of river		13	13	26
Mean fish abundance (fish per 100 m)		3.4	3.7	7.1
Largest fish	Weight	0.18 kg (0.4 lb)	0.01 kg (0.02 lb)	0.18 kg (0.4 lb)
	Length	25 cm (10 “)	10 cm (4 “)	25 cm (10 “)
% of catchable (20 cm +) fish		6.7 %	0 %	3.6 %
Average size of catchable fish (20 cm +)		25 cm (10 “)		25 cm (10 “)
Abundance of catchable fish per 100 m		0.23	0	0.23
Other species present:	2 spined blackfish, galaxiid minnows, redfin perch, roach and yabbies			



Jamieson River size range in 2018



Jamieson River abundance



The 2018 survey suggests the Jamieson River supports moderate numbers of brown trout and rainbow trout. Abundance of brown trout is similar to recent years whereas abundance of rainbow trout has increased over the last three years. Abundance of both species in 2018 is above long-term average (LTA) values. There is evidence of recent recruitment of rainbow trout, but not brown trout. There are some mature fish capable of spawning present. Note that Jordan Scotty incubator boxes containing brown trout eggs were placed in the Jamieson in 2017 (see Bryne *et al*. this document).

Location: King River system (below Lake William Hovell)

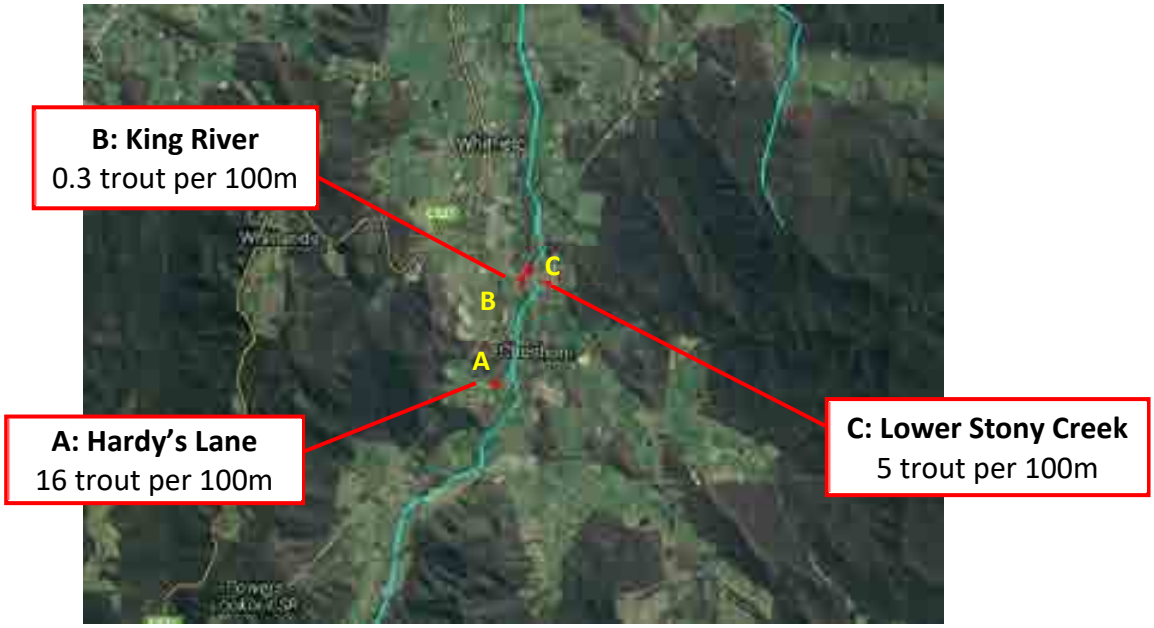
Surveyed: 24 Jan. 2018

Site A: Hardy's Lane, Queens Creek (180 m stretch)
Site B: King River below Queens creek Junction (290 m stretch)
Site C: Lower Stony Creek (310 m stretch)

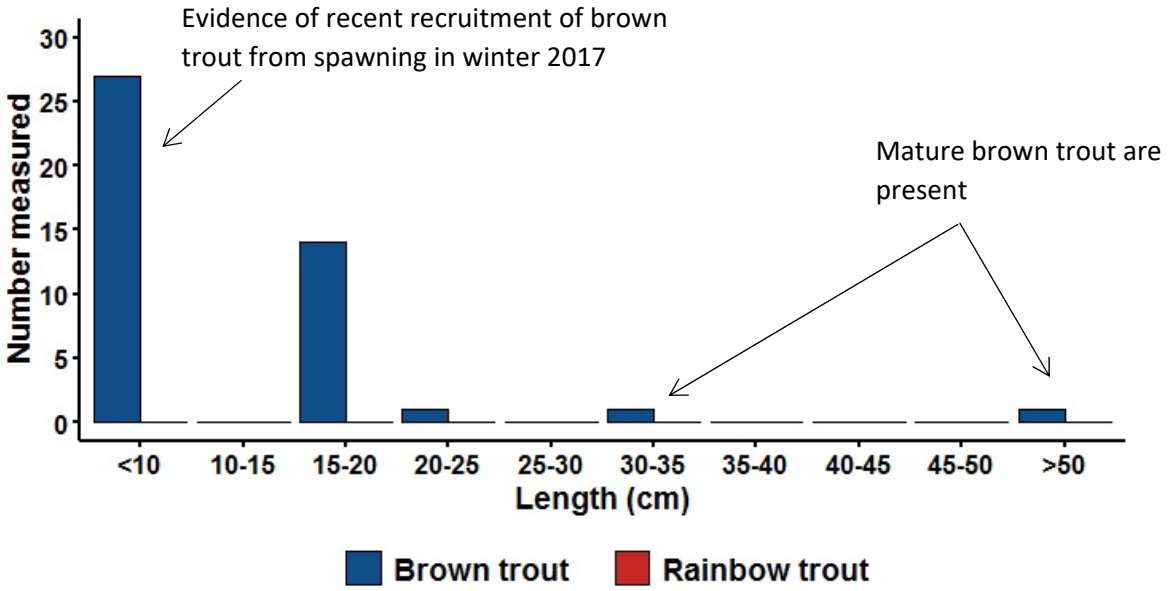
Key health indicators

Abundance	⇧
Recent recruitment	✓
Multiple size classes	✓
Mature fish	✓
Overall rating	Very good

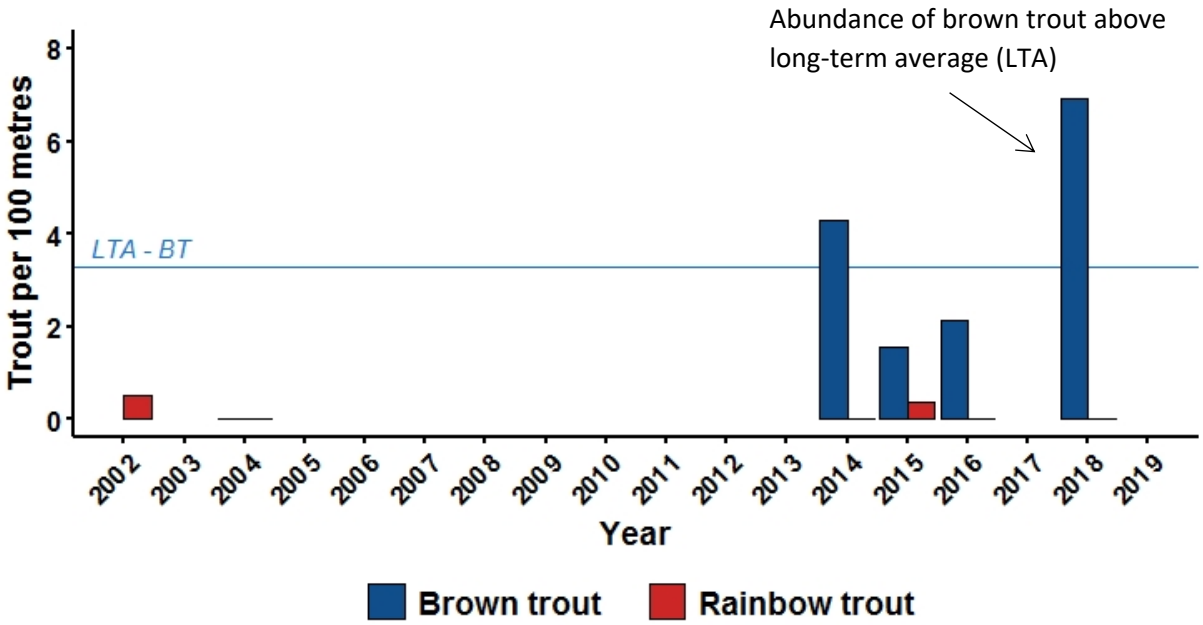
Monitoring results		Brown trout	Rainbow trout	ALL TROUT
Total number of fish caught in 780 m of river		44	0	44
Mean fish abundance (fish per 100 m)		6.9		6.9
Largest fish	Weight	0.2 kg (0.4 lb)		0.2 kg (0.4 lb)
	Length	48 cm (19 ")		48 cm (19 ")
% of catchable (20 cm +) fish		4.4 %		4.4 %
Average size of catchable fish (20 cm +)		37 cm (14.5 ")		37 cm (14.5 ")
Abundance of catchable fish per 100 m		0.3		0.3
Other species present:	2-spined blackfish, common carp, galaxiid minnows, gambusia, Murray cod, Murray spiny crayfish, southern pygmy perch and yabbies			



King River system size range in 2018



King River system abundance



The 2018 survey suggests the King River system below Lake William Hovell supports good numbers of small to medium sized brown trout, whereas rainbow trout are rare. Abundance of brown trout in 2018 is above the long-term average (LTM). There is evidence of recent recruitment and mature brown trout capable of spawning are present. Note that Jordan Scotty incubator boxes containing brown trout eggs were placed in the King River in 2017 (see Bryne *et al*. this document).

Location: Traralgon Creek

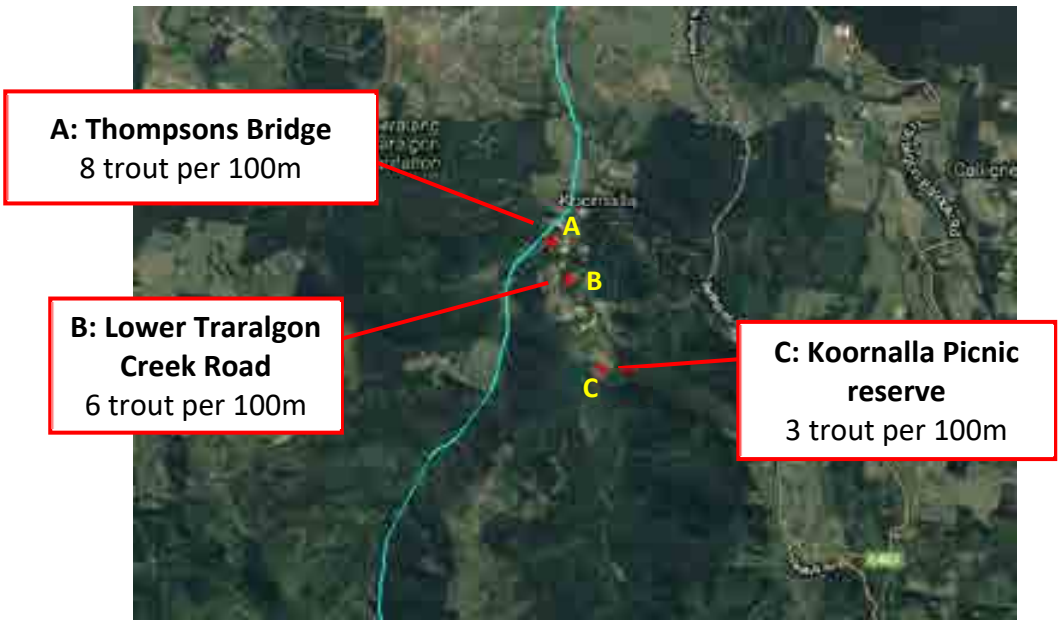
Surveyed: 30 Jan. 2018

Site A: Thompsons Bridge (270 m stretch)
Site B: Lower Traralgon Creek Road (360 m stretch)
Site C: Koornalla Picnic Reserve (290 m stretch)

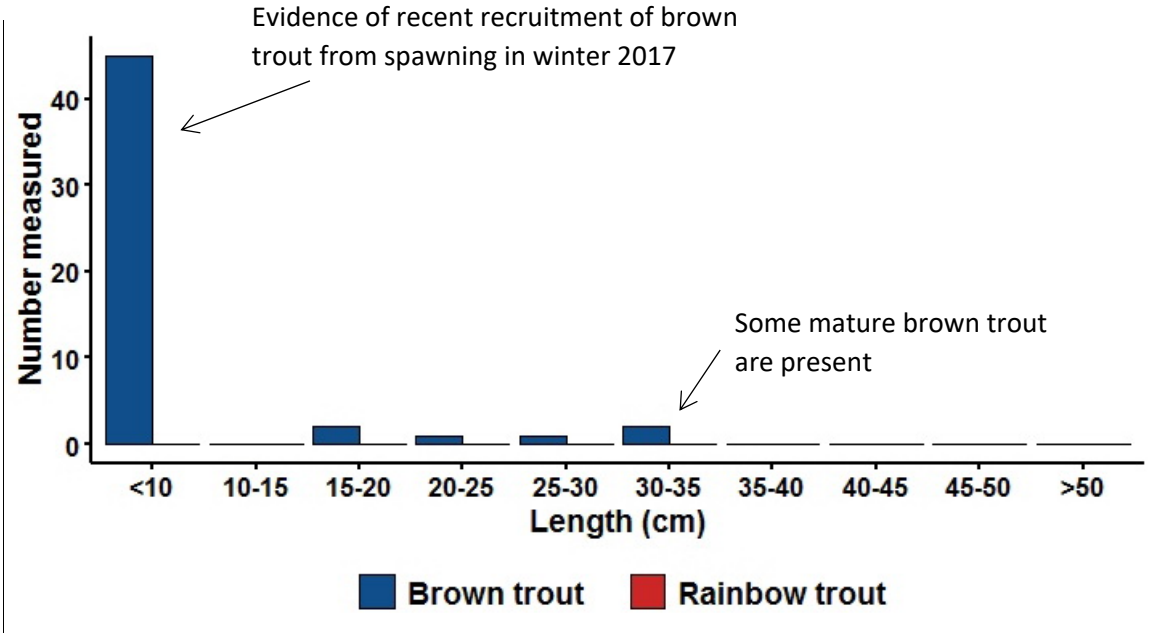
Key health indicators

Abundance	?
Recent recruitment	✓
Multiple size classes	✓
Mature fish	Some
Overall rating	Good

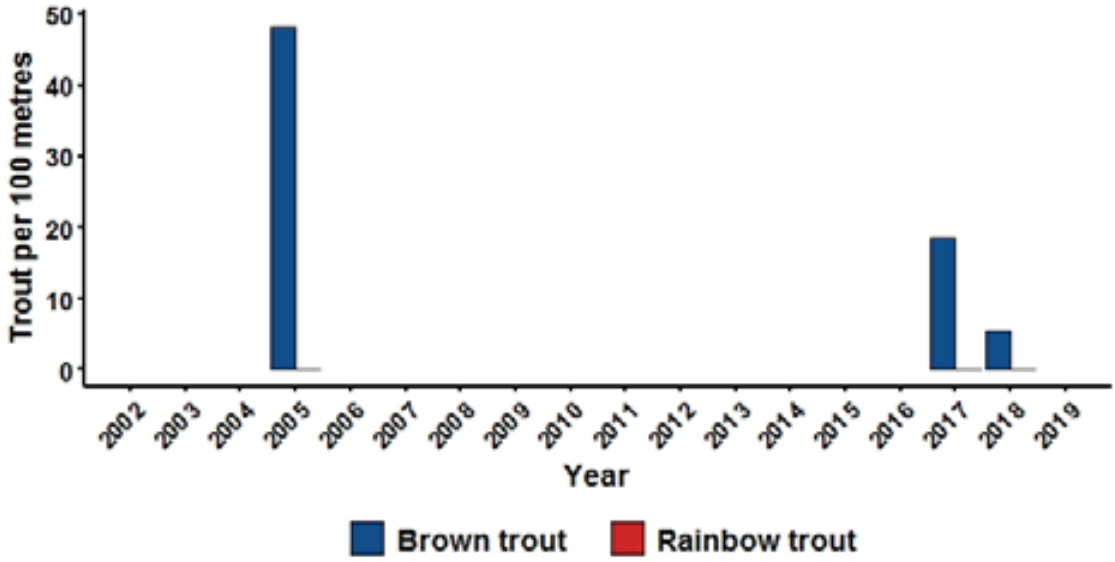
Monitoring results		Brown trout	Rainbow trout	ALL TROUT
Total number of fish caught in 920 m of river		51	0	171
Mean fish abundance (fish per 100 m)		5.5		18
Largest fish	Weight	0.07 kg (0.2 lb)		0.07 kg (0.2 lb)
	Length	28 cm (11 “)		28 cm (11 “)
% of catchable (20 cm +) fish		5.6 %		5.6 %
Average size of catchable fish (20 cm +)		26 cm (10 “)		26 cm (10 “)
Abundance of catchable fish per 100 m		0.3		8.5
Other species present:	Australian smelt, longfin eel, shortfin eel, Gippsland spiny crayfish, lamprey and tupong			



Traralgon Creek size range in 2018



Traralgon Creek abundance



The 2018 survey suggests the Traralgon Creek supports moderate numbers of brown trout. Rainbow trout are absent. There is strong evidence recent recruitment as indicated by the presence of a large number of small (<10 cm) brown trout, and mature trout capable of spawning are present. There are insufficient historic abundance records to compare with current results, although abundance has declined since 2017. Note that Jordan Scotty incubator boxes containing brown trout eggs were placed in the Traralgon Creek in 2017 (see Bryne *et al*. this document).

Appendix I: Wild trout streams surveyed as part of the Wild Trout Wild Trout Fisheries Management Program

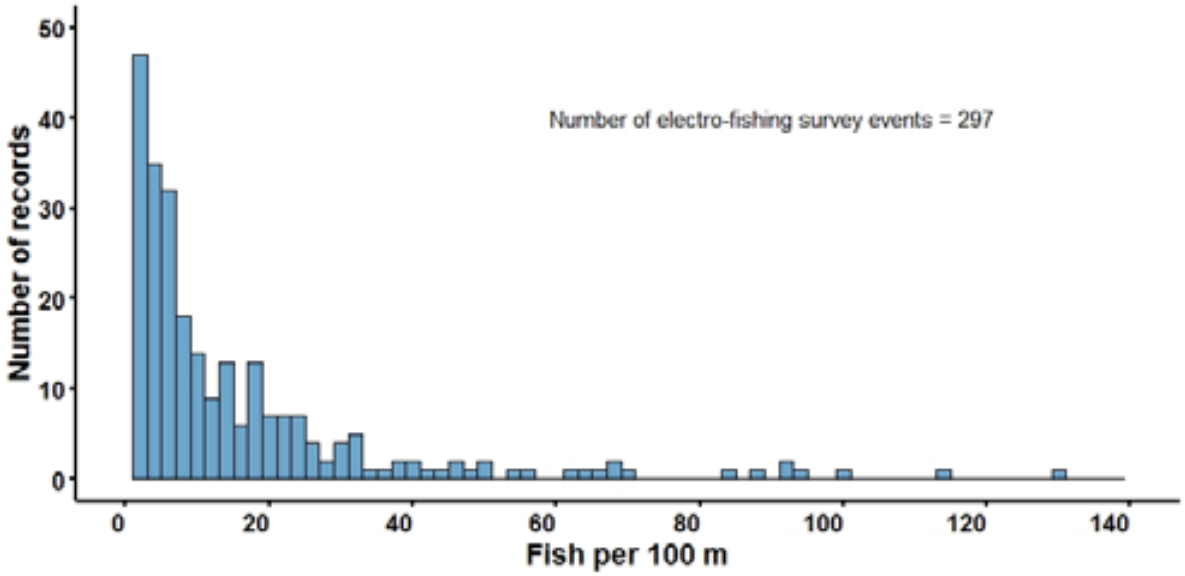
Results of surveys of selected wild trout streams conducted as part of the Wild Trout Wild Trout Fisheries Management Program. See Hunt and Lieschke (2015), Hunt and Lieschke (2016), Ingram *et al.* (2017) and Ingram and Lieschke (2018, this report) for further details.

Stream	Year last assessed	Abundance	Recent recruitment	Multiple year classes	Mature fish	Overall rating
Aire River	2015	Not scored	✓	✓	Some	Moderate
Barkly River	2016	Not scored	✓	✓	✓	Very good
Buckland River	2018	⇧	✓	✓	✓	Very good
Dargo River System (including Two Mile Creek)	2016	Not scored	✓	✓	Some	Good
Goulburn River tailrace	2017	⇩	Some	✓	✓	Moderate
Upper Goulburn River	2018	⇧	✓	✓	✓	Excellent
Howqua River	2018	⇧	✓	✓	✓	Excellent
Jamieson River	2018	⇔	✓	Some	Some	Good
Kiewa River system (including Running Creek)	2016	Not scored	✓	✓	✓	Excellent
King River	2016	Not scored	✓	✓	✓	Good
King River system (below Lake William Hovell)	2018	⇧	✓	✓	✓	Very good
Merri and Hopkins Rivers	2017	?	Some*	✓	✓	Excellent
Mitta Mitta River system (including Bundara River and Big River)	2017	⇩	✓	✓	✓	Good
Morass Creek	2016	Not scored	✓	✓	✓	Very good
Nariel Creek system (including Wheeler Creek)	2017	⇩	✘	✓	✓	Low
Ovens River system (including Buckland River)	2017	⇩	✓	✓	✓	Moderate
Tooronga River	2015	Not scored	✓	✓	✓	Excellent
Traralgon Creek	2018	?	✓	✓	Some	Good
Wellington River	2017	?	✘	Some	✘	Low
Yarra River	2015	Not scored	✓	✓	✓	Good

* Recruitment likely due to recent stocking.

Appendix II: Historic trout abundance

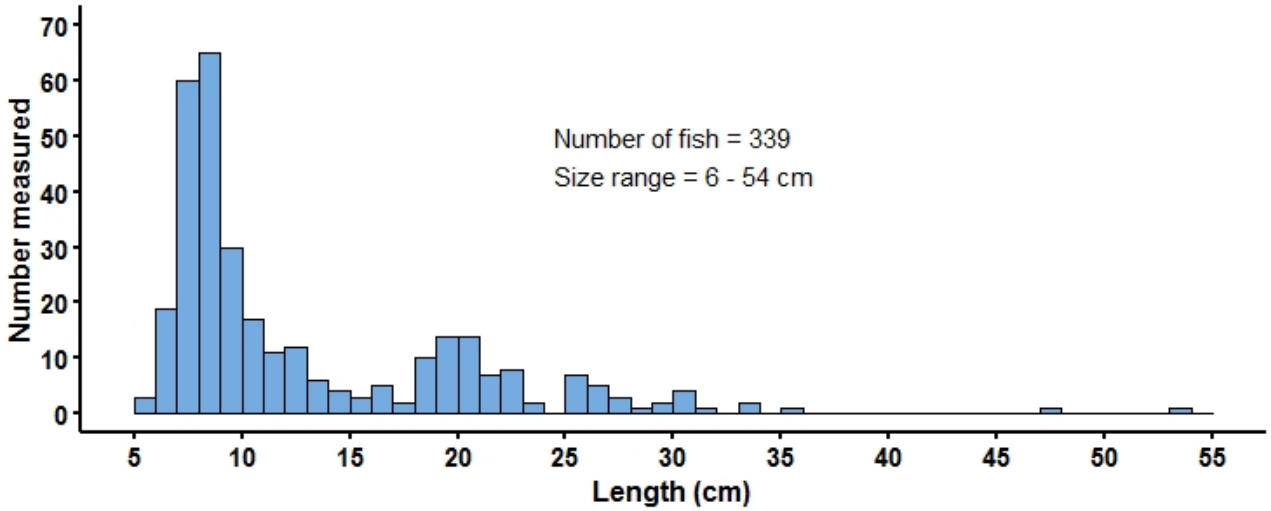
Abundance of trout (fish per 100 m) estimated from historic electro-fishing survey data and contemporary electro-fishing surveys of trout streams conducted as part of the *Wild Trout Wild Trout Fisheries Management Program* (Appendix I) (297 events).



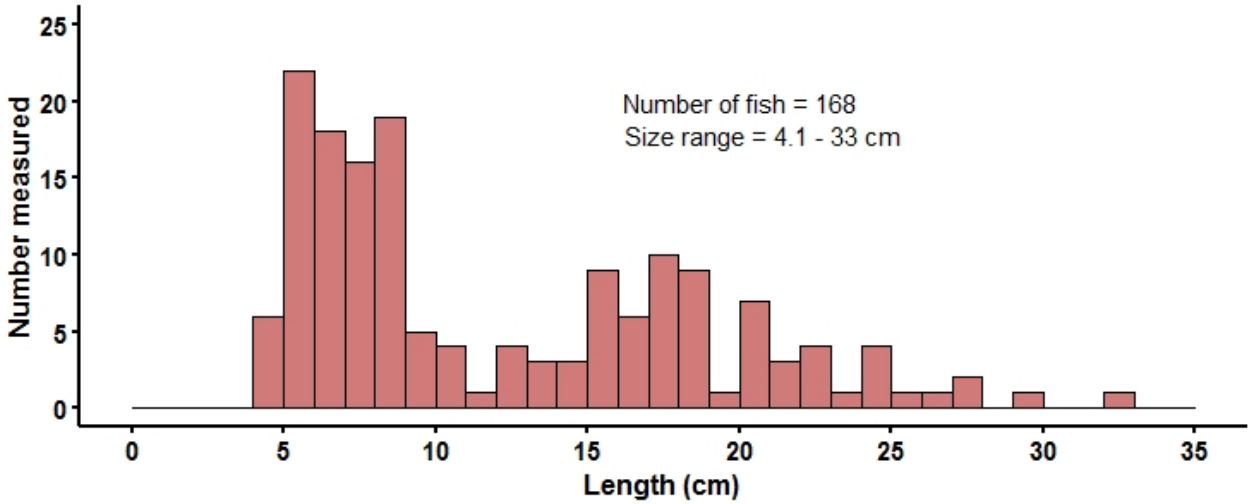
Abundance:	Low	< 1 fish per 100 m
	Moderate	1 –5 fish per 100 m
	Good	5 – 15 fish per 100 m
	Very good	15 – 25 fish per 100 m
	Excellent	25 – 50 fish per 100 m
	Exceptional	> 50 fish per 100 m

Appendix III: Size range of brown trout and rainbow trout surveyed in 2018

Brown trout

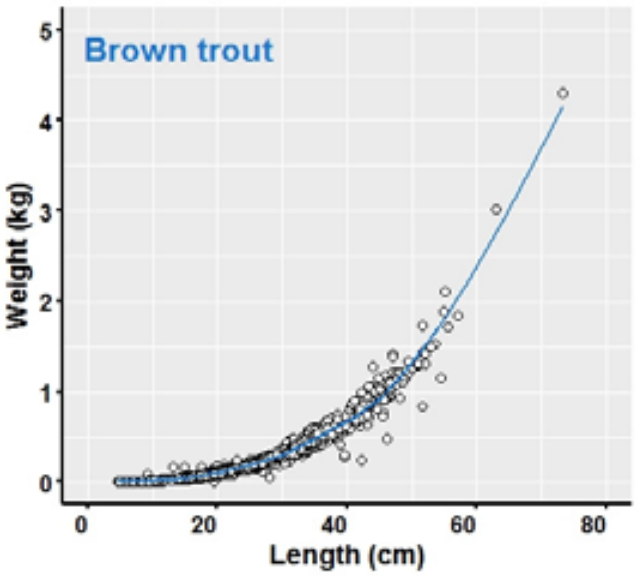


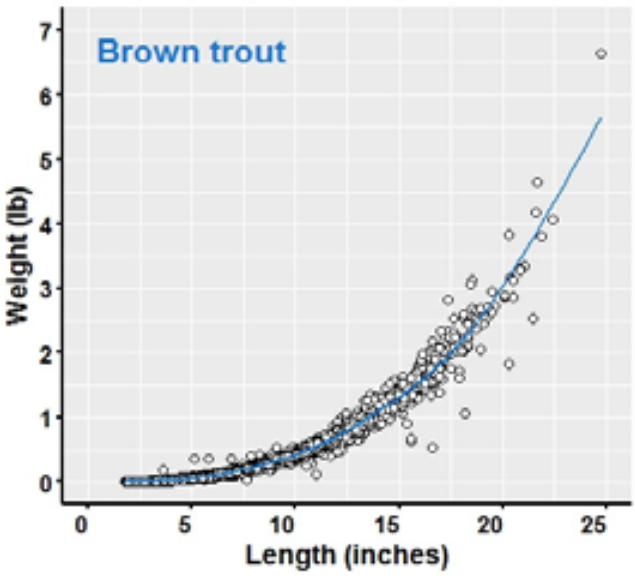
Rainbow trout



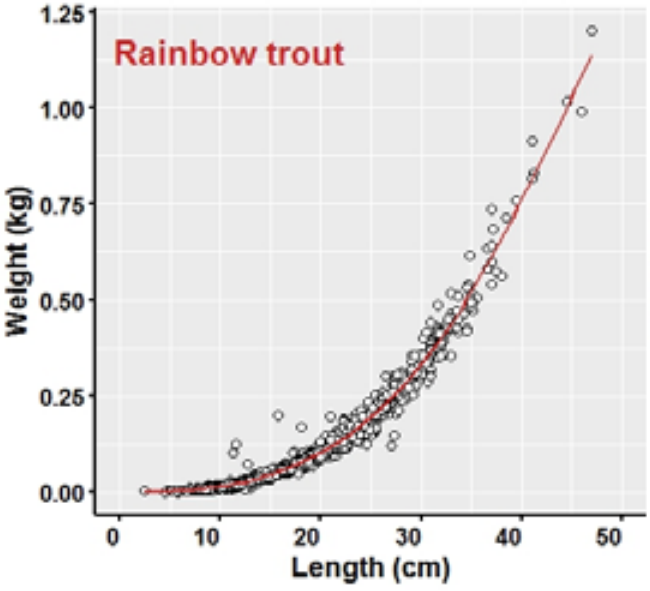
Appendix IV: Trout length – weight relationships

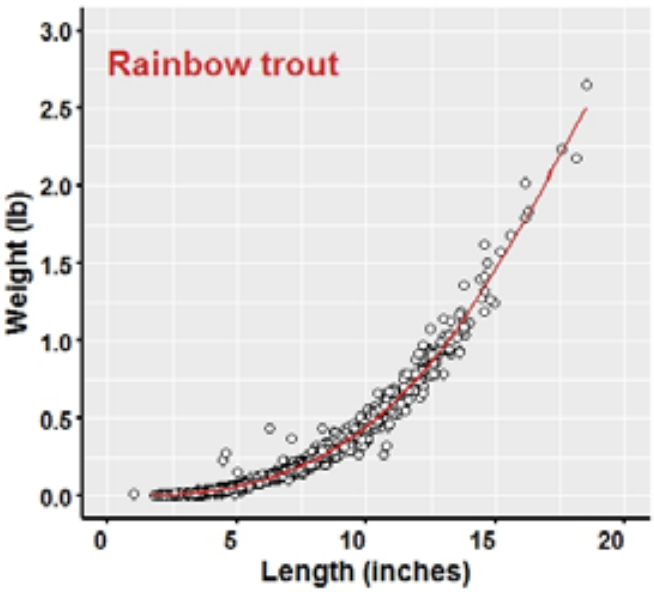
Brown trout





Rainbow trout





Yearling trout stocking trials

John Douglas
Victorian Fisheries Authority

Introduction

Trout anglers reported serious declines in fishing in many of Victoria's most famous and popular wild trout streams over the summer of 2013-14. Streams, which had performed well over time, now had poor fishing and suspected low trout numbers. Anglers were concerned about their future angling and were looking for ways to restore the populations. One method suggested was fish stocking.

Fish stocking is a common fisheries management tool with an apparent simple logic because if there are no fish in the river, then putting some in will fix it. However, research over the years has shown that stocking is not a panacea for all fisheries ills and the success of stocking depends on many circumstances. While stocking can be extremely effective in some situation, it may not be suited to streams where an existing trout population is present.

The Wild Trout Fisheries Program provided the opportunity for the Victorian Fisheries Authority to work with anglers to revisit trout stocking in streams. A trial stocking project was established to investigate if stocking was a means of quickly restoring depressed populations and therefore improve angling.

The three-year stocking trial started in 2015 and concluded in 2017

What was done

The trial investigated the initial and long term survival of the stocked fish in the existing trout populations.

The trial focussed on two steams, the upper Goulburn River (above Lake Eildon) and the Howqua River. The rivers were stocked with 5,000, one-year old brown trout, once each year, for three years (2015, 2016, 2017).

The stocked fish were fin clipped to identify them from the wild fish. Angler volunteers from the Mansfield and District Flyfishing Club, the Australian Trout Foundation and other interested anglers clipped the fish. These same volunteers also helped with the release of the marked fish into the study rivers.

Electrofishing was undertaken in 2015, 2016 and 2017 to sample the trout populations and recover fin clipped fish in the study rivers.

Fish stocking and survey results—Summary

Survey Year	River	Cumulative fish stocked	Distance surveyed	No. stocked fish captured
2015	Goulburn River	5,000	1 km	1
	Howqua River	5,000	14 km	6
2016	Goulburn River	10,000	1 km	0
	Howqua River	10,000	2.5 km	4
2017	Goulburn River	15,000	1 km	0
	Howqua River	15,000	1 km	6

Outcome

Overall, of the 30,000 brown trout stocked only 17 stocked fish were recaptured. The low proportion of stocked fish in the overall population indicates that the stocked fish did not increase the trout population of the trial streams, nor improve the fishing.

The stocked fish that were recovered were all from the most recent stocking. No two or three year old stocked fish were detected. It would appear that even if some fish initially survive, few stocked fish survive into the next year.

Making sense of the results

Fish stocking is often seen as the answer to fix a poorly performing fishery because it has an apparent logical sequence: if there are no fish in the water, and you put fish in, then there are now fish in the water. This logic seems plausible on the surface but as these, and other stocking trials show, it is not that simple.

The failure of stocking to increase populations in the Howqua and upper Goulburn rivers is not unique. Numerous stocking trials have been undertaken in Victorian streams in the past, with similar results. Comparable results have also been reported from stocking studies in other countries too. The consensus is that stocking is ineffective where there is an existing breeding trout population present.

The reasons for the failure of put and grow stocking to enhance existing stream trout populations are not well described but competition with the resident trout is likely to be an important factor. Competition between individuals is an important population control process and the resident fish have the advantage.

Trout grown under intensive hatchery conditions with regular high nutritious meals, learn to feed aggressively. If they don't compete against the thousands fish in their race, they don't get the food and die. Hatchery trout are conditioned to respond to regular aerial delivery of high energy pelleted food, They may be less equiped to seek natural live food. The result is that the fish that do well in the hatchery are the bolder, more aggressive feeding fish. However, these traits—that may be beneficial in the hatchery—are not conducive to long term survival in the wild when the hatchery fish must compete with the existing resident fish.

Studies have shown differences in behaviour between released hatchery fish and the resident wild fish hatchery fish tend to spend more time in the faster water and seek food more aggressively than wild fish. Wild fish control the best feeding lies and use less energy to catch their food. The hatchery fish can use more energy to catch their food than they get from eating the

Figure 1 Adipose clipped trout

Figure 2 Volunteer anglers clipping trout

Figure 3 Electrofishing

Figure 4 Sampled wild brown trout

food and don't get enough energy from their food. They lose condition and weaken. The result is that the fish cannot survive for long as they cannot effectively compete with the wild fish for the limited food resources.

The learned hatchery behavioural may be negated to a degree by stocking with eggs. And egg incubator trials are currently being conducted in collaboration between anglers and the Victorian Fisheries Authority (see elsewhere in these proceedings) to investigate if this is an effective population recovery strategy.

Mansfield District Fly Fishers Club assisting with stocking fin-clipped trout into the Goulburn River

Not all bad

The results of the stocking trial may seem disappointing for those that hoped to see the stocked fish make a difference and increase the trout population, but there other leanings from the work.

The surveys undertaken for the stocking trials have demonstrated the ability of wild trout populations to quickly recover from lower numbers. The surveys indicate an improvement in the trout population in these rivers since 2014, and the improvement was through wild fish, not stocking. Wild trout populations are resilient and can quickly recover—given suitable conditions. This give confidence that fish and ultimately fishing will return from depressed numbers when the environmental conditions are suitable. This has happened through many droughts, fires and floods in the past.

Populations are always limited by something and cannot keep expanding. The size of a trout population is primarily limited by the environmental conditions, including water flows, water temperatures, amount and type of habitat, the amount and type of food available, and the presence of competitors and predators.

Varying environmental conditions regulate on how many trout the stream can support and the result is that stream trout populations are naturally irregular and have large fluctuations in fish numbers. When conditions are good, the trout thrive and numbers increase, but when conditions are bad, the population declines.

The ability of trout populations to quickly respond to good conditions is based in their reproductive strategy.

The reproductive strategy of trout is to have many of offspring in one reproductive event. This type of strategy is very suited to areas with uncrowded environments where the population can expand rapidly, or in hazardous environments where only a few will survive, or in rapidly changing environments where swift adaptation is needed. In streams where populations of trout exist, the strategy provides the mechanism for the population to naturally recover very quickly and means that trout populations are resilient and will bounce back quickly — given suitable conditions.

Conclusion

Past fisheries research in Victoria on wild trout fisheries, and in similar trout fisheries worldwide, indicate that stocking where self-sustaining (breeding) populations of trout existing is generally an ineffective long-term strategy to enhance wild stocks. It often provides a very low-return to anglers at considerable expense.

Fish stocking has its place and is a useful management tool to help improve struggling fish populations, but in streams where a breeding trout population already exists, put and grow stocking is not the best strategy.

If we understand that stream trout populations fluctuate due to circumstances out of our control, but have faith that they can recover quickly, then where we can best help is by concentrating efforts on what we can control.

Focussing on mitigating adverse environmental impacts by restoration of riparian vegetation, improving habitat instream and allowing connectivity along streams, will assist the trout to do their own restocking.

Acknowledgements

The VFA takes this opportunity to sincerely thank the Mansfield and District Fly Fishing Club and their supporters who volunteered hundreds of hours to support this project. They fin-clipped trout in the cold Snobs Creek hatchery, released stocked fish and helped-out with trout fishing surveys. This works was sustained by goodwill, wet weather gear and lots of BBQ sausages.

Theme 2 – Managing trout

Climate and trout - forecast and ground truths

Dr John Morrongiello[1] and Prof Nick Bond[2]
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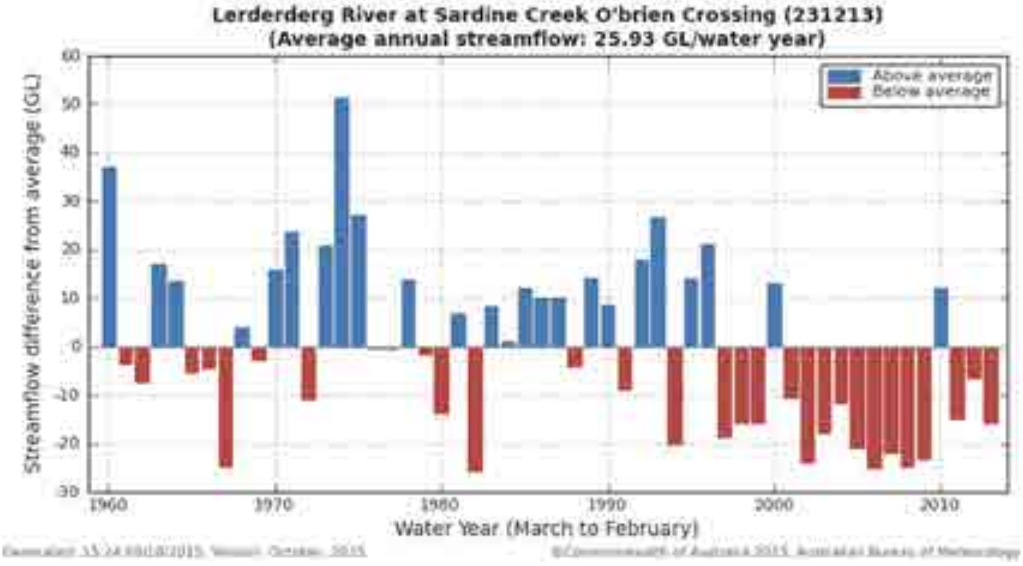
[2]Murray Darling Freshwater Research Centre, La Trobe University, Albury, NSW, Australia

Our climate is rapidly changing. Rainfall has declined across much of Victoria and this has led to significant reductions in stream flow. Air temperatures have increased, and we're seeing a greater frequency and intensity of extreme weather events like heatwaves and climate phenomena like drought. These changing conditions pose challenges for our river trout that need cool, well oxygenated and flowing waters to thrive.

It is essential that we understand how trout have responded to past climatic change so we can make meaningful predictions of how future declines in rainfall and increases in temperature will impact on trout. In turn, this knowledge will help managers make proactive decisions about where, when and on what, resources should be directed to mitigate climate threats to trout and facilitate fisheries persistence and adaptation. Likewise, anglers can benefit from this information about their fishery's future. It can help facilitate engagement in activities directed at improving fishery quality, and even make decisions on where and when to fish to ensure they have a great day on the water.

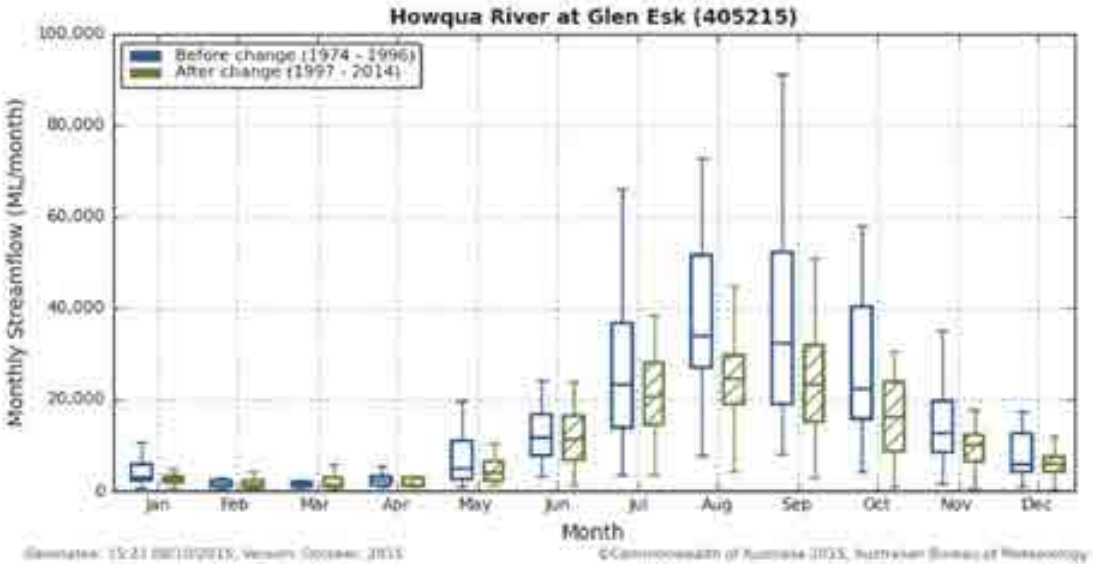
Ground truths

Recent climatic change has already impacted on Victoria's trout. It is important to acknowledge, however, that not all regions have suffered the same level of rainfall reduction or warming. The Lerderderg River, for example, has experienced significant streamflow declines over the last 50 years, punctuated by an abrupt drop around 1996.



Lerderderg River annual average streamflow anomalies for the period 1960-2013 (Department of Environment, Land, Water and Planning records). Streamflow anomalies are the difference between a year's average flow and long-term average, with blue bars representing wetter than average years, and red bars drier than average years.

In contrast, some streams have not experienced a long-term decline in flow. Rather they show a step change in average conditions. For the Howqua River, this step change (a technical term used to describe an abrupt shift in average flow conditions) also occurred around 1996, with conditions prior to this generally wetter than those in more recent years. Further, we see that this step change was predominantly brought about by a decline in late winter and spring stream-flows (August- October). This is a critical period for trout as fry are emerging from their gravel nests and adults are beginning to put on condition after a slow winter.



Howqua River average monthly stream flows before (blue) and after (green) the 1996 'step change' (Department of Environment, Land, Water and Planning records). Data are shown as 'boxplots', a tool used by scientists to illustrate the central tendency and variability of data for a given time period (here months).

The impacts of reduced rainfall and streamflow on trout was clearly seen during the recent Millennium Drought (1997-2009). During this period, much of southern Australia experienced record low rainfall, and the flows that kept our favourite trout streams cool and well oxygenated were reduced to a trickle. A 2005 survey of upland streams revealed some stark results. Across Victoria, there was on average a 20% decline in trout numbers, and a 20% decline in the number of sites occupied by trout compared to data form 1998. Like flow changes, however, things were not the same in all regions across the state. For example, no patterns in abundance and sites occupied were observed in the upper Yarra catchment, a region which only experienced relatively small declines in streamflow Conversely, the Central Highlands and Grampians districts, regions that got very dry, suffered a 55% and 100% decline in trout.

Forecasts

Fish biologists can use their understanding of how trout have responded to past environmental change to forecast what Victoria's trout fisheries might look like in the future. For a trout angler, the predictions are sobering (Bond et al. 2011). Under a range of climate change scenarios, we could see a 35-50% decline in trout distribution across the state by 2030 without management intervention. We are now performing a novel regional 'downscaling' of state-wide climate change impacts to identify areas highly vulnerable to further drying and warming, and those relatively resilient to future change. This information will be used to help prioritise management activity.

The good news is that we have a range of tools available to help manage our trout fisheries. These could include targeted revegetation to maximise stream shading, identification and protection of fish thermal refuges, promoting angler behaviour that enhances post-release survival, managing dams to optimise water temperature in downstream reaches, stocking, and even selective breeding of 'drought-tolerant' trout.

Bond, N., J. Thomson, P. Reich, and J. L. Stein. 2011. Using species distribution models to infer potential climate change-induced range shifts of freshwater fish in south-eastern Australia. Marine and Freshwater Research **62**:1043-1061.

Repairing where fish live

Terry George, Australian Trout Foundation and **Mike Burgess**, VRfish

Habitat and Anglers (Mike Burgess, VRFish)

The success of Victoria's recreational wild trout fishery is dependent implementing adaptation strategies and building resilience in the face of changing climatic conditions and habitat degradation.

Repairing where our wild trout live including enhancing riparian vegetation and in-stream habitat can assist to lower water temperatures, reduce sedimentation, improve water quality and hydrological diversity and provide refuge areas. Better habitat also supports better fishing opportunities—a notion fully understood and supported by all Victorian fishers. A survey by VRFish of nearly 1900 recreational fishers in 2017 demonstrated that improving and protecting fish habitat was Victorian fishers number one priority for investment.

Trout anglers are acutely aware of the need to restore wild trout habitats and recognise the large and urgent task. This has resulted in the Australian Trout Foundation, VRFish and other angling clubs to mobilise towards identifying, supporting and participating in on-ground works. Strong partnerships have been and continue to be developed with Catchment Management Authorities, Victorian Fisheries Authority, DELWP and ARI.

With a clearly understood need to repair habitat, underpinned with a sense of urgency there is a need to support anglers in building their capacity to do more in line with their motivations, enthusiasm and success. This trend has occurred overseas and we can take learnings from those programs and apply them to the Victorian wild trout context.

There are unique advantages of anglers taking more responsibility or leading fish habitat works and advocacy. Anglers can leverage their local community networks to assist such as farmers, influence public policy, advocate for greater funding and are free to speak up against management or proposals that can threaten fish habitat.

Meeting the future demands should focus on developing skills and offering training to anglers to support such as project administration, volunteer management, how to apply for grants,

Angler Riparian Partnership Program Project in 2017/18

Little River - August 2017

Jamieson River – September 2017

Steavenson River – May 2018

communications and promotion, and scoping the need for more on-ground skills such as plant identification, weed and pest control, fencing and surveying.

Thus far, a network of volunteer-based groups and individual 'champions' have achieved a great deal. To meet the challenge at hand and aspirations of trout anglers, further resourcing and enhanced coordination is required to mobilise even more anglers and undertake more and larger projects.

On-ground works: Anglers in Action (Terry George, Australian Trout Foundation)

Speakers at previous Talk Wild Trout conferences who preached "Habitat, Habitat, Habitat", have had a profound effect on recreational anglers, clubs, waterway managers and other organisations. The speakers identified the risks facing our wild trout fishery and showed the paths needed to alleviate such risks.

Dr John Morrongiello's presentation on "Climate change and trout - a way forward" at Talk Wild Trout 2016 rang the alarm bells very loudly and triggered "action stations" for many passionate recreational anglers and other resource management organisations.

A 'Habitat Team', including representation from the Victorian Fisheries Authority (VFA), Australian Trout Foundation (ATF), Native Fish Australia (NFA), VRFish, the Department of Environment, Land, Water and Planning (DELWP), Arthur Rylah Institute (ARI), and the Catchment Management Authorities (CMA's), teamed up and formed partnerships with recreational angling clubs to identify and complete riparian and in-stream habitat restoration projects.

Examples of the past and current projects are below, and a huge vote of thanks must go to all the volunteer angling clubs and anglers who participated; with your continuing help, we can make a huge positive impact on the health of our streams and thus on the health of our wild trout fishery.

Fish Habitat Workshops

The ATF was grateful to acquire funding from VFA & DELWP to present Fish Habitat Workshops in North East Victoria, Melbourne, Gippsland and South West Victoria.

The main purpose of these Fish Habitat Workshops is to create awareness of the threats to our waterways and fisheries, and to assemble an army of "Habitat Soldiers" to join in partnerships and take some responsibility in restoring the health of our waterways and fisheries, by identifying and completing habitat restoration projects.

In-stream habitat restoration projects

King River – 2017/18

Howqua River – 2018

Buckland River – 2018

The first workshop was held on 28th April at Myrtleford with 61 attendees actively participating in discussions during the day. The presenters and discussion leaders were from ATF, NFA, ARI, VFA, VRFish, Goulburn-Broken CMA, North east CMA, Victorian Fly Fishers Association, Harrietville Angling Club and the Benambra Angling Club.

Resulting from an exercise of 4 groups discussing streams, 19 suggested habitat restoration and access projects were identified for investigation.

More good news is that funding proposals for two of these suggested projects has already been approved by VFA. The projects being:

(a) Rubicon River Thornton In-stream and Riparian Habitat Restoration - $38,830; and

(b) Mitta Mitta River Tallandoon In-stream and Riparian Restoration - $26,330.

The remaining suggested projects will be considered in conjunction with a team from the newly formed "Fish Habitat & Flows Alliance".

Workshop attendees also visited the Buckland River habitat restoration project where 35 dead hardwood trees with root balls attached were strategically placed and pinned in the river with 75 x 6m red gum stakes, together with 84 tonnes of boulders. Andrew Briggs (NECMA), Terry George (ATF) and Jarod Lyon & Renae Ayres (ARI) explained to the group how the placement of boulders and snags would create and enhance in-stream habitat to provide cooler water (depth), refuge and food sources for the fish that would congregate in those areas. This project is funded by an RFL Grant.

Funding Projects

The importance of habitat should not be understated and projects that restore habitat are vitally important. Funds are available for habitat restoration projects. At Talk Wild Trout 2016, DELWP launched the "Angler Riparian Partnership Program" which provides funding for Riparian Restoration Projects in partnership with CMA's.

Large and small RFL Grants are also available for more costly projects that involve works such as in-stream habitat restoration and/or angler access projects.

Myrtleford habitat workshop

Workshop visiting Buckland habitat works

Thank you

The VFA, ATF, NFA, VRFish, ARI & CMA's would like to acknowledge and thank the Volunteers from Angling Clubs, Community Groups and Organizations who donated their time and participated in Habitat Restoration Works over the past year. The Habitat Army is growing and there's too many to list in this article.

The next Fish Habitat Workshop will be held in Melbourne on 6th October and Clubs & Anglers are welcome to register their interest to attend at the ATF Stand in the Foyer. In addition, if you are not already registered as Habitat Project Volunteer, you may also do so at the ATF Stand.

Jordan Scotty Incubator Trials - first year findings

Matt Byrne[1], Terry George[1] and Brett Ingram[2]
[1]Australian Trout Foundation, [2]Victorian Fishery Authority

Background

Fish stocking is an important tool in the fisheries manager tool box but success is not all ways as straight forward as putting fish into waters. Hatcheries can produce the numbers and a variety of sizes of trout, but what is the right size fish for the stocking application and do the released fish have the ability to survive in the wild?

In Victoria, there has been a tendency to stock larger trout—typically yearlings—as research indicates that these larger fish have less predators and are thought to have the best chance of survival. This strategy works very well in lakes and forms the basis of Victoria's still water stocking program, but the recent stocking trials of hatchery trout in the Goulburn and Howqua, show this is not necessarily the case in rivers. Previous investigations, both in Victoria and overseas, indicate that stocking of yearling hatchery fish into streams with existing wild trout populations does not improve fish numbers.

The questions raised are why this is so, and is there an alternative strategy that can be used instead of stocking yearlings?

Because the trout have grown up in the hatchery under crowed conditions, the successful fish are the ones that compete well under hatchery conditions. It is possible that the behaviours learned at the hatchery are not suited when the fish are released into the stream. Studies of comparing stocked fish with wild trout in the wild indicate important differences in behaviour.

When hatchery -raised fish are stocked into a stream, they behave much differently than the existing wild fish. Stocked tend to feed more aggressively, spend more time in swimming in the faster water and rapids, and generally move about much more than the wild fish. All this activity uses up energy. The fish use more energy to catch the food than they get from eating the food and therefore lose condition and cannot compete with the wild fish. The traits learned at the hatchery are not suitable for the streams. But is there a way around it?

The Australian Trout Foundation has been working in partnership with recreational fishing clubs and the Victorian Fisheries Authority to maintain and enhance wild trout fisheries. The yearling stocking trials (reported in these proceedings) was not successful but based on the results the Australian Trout Foundation were keen to investigate other methods to aid recovery of depressed trout populations.

One method to avoid any learned hatchery behaviour is to stock with eggs.

The Jordan/Scotty Fish Egg Incubator is a commercially available plastic unit which was developed to incubate salmon or trout eggs in-stream. The design of individual housed eggs eliminates or minimizes fungus infection, and eggs are protected from predators. The stocking of eggs eliminates any learned behaviour and the young fish learn to survive in the wild from the get go, therefore may ultimately lead to higher survival of stocked fish compared to stocking hatchery-grown yearling trout.

A trial of the incubators was subsequently initiated.

What was done: The Trial

The study is planned to run for two years and began in the winter of 2017. It is at the halfway mark now. Three streams, the King and Jamieson rivers and Traralgon Creek were initially used in the first year of the trials, and this was expanded in 2018 with the addition of the Dargo River.

Brown trout eggs were stripped and incubated to the eyed stage at Snobs Creek. DNA samples were taken from the parents of these eggs so that fish hatching from the eggs stocked in the incubators could be subsequently identified to assess the trial.

Once eyed, the eggs were loaded into the Scotty Jordan boxes, and then transported and deployed in the study streams.

The incubators are removed several weeks after deployment, once the eggs had time to hatch and the trout larvae absorb their yolk sac and leave the incubators.

On removal, a quick count of any unhatched eggs (identified as white with and fungus) gives an indication of the hatch rates. The 2017 deployed incubators had relative good hatch rates estimated to range between 75-90%.

Sampling of young of the year fish is done in the following summer when fish of around 50-60 mm can be readily electro-fished. DNA is extracted from a tissue samples taken from these fish, and this is then to the DNA from the Snobs Creek parent fish to determine if the young fish is stocked or wild.

Eyed trout eggs in Scotty Jordan incubators have been stocked in 2017 and 2018 and there has been one round of young of year sampling undertaken.

Early Results

Young of the year trout were captured from each stream around the sites where the egg incubator trials were conducted. Unfortunately, there were issue with the extraction of DNA and sufficient DNA could not be extracted from all the fin clip samples to genotype the fish. Therefore, not all the fish that were sampled could be compared to the Snobs Creek parent fish to assess their source as stocked or wild. The reduced sample size limits analysis and conclusions.

However, although limited, the information shows some evidence of the stocked fish in the samples, and it appears that the results are likely to vary among the streams.

The Jamieson River had the lowest number of sampled young of year trout (12), but of the trout that could be genotyped (4), three were assigned to Snobs Creek parents and thus were stocked fish.

In contrast, Traralgon Creek had a high number of young of the year sampled (45) but of the fish that were successfully genotyped (35), only one of these fish may have been stocked.

Year	Water	Number eggs stocked	Number young of year sampled (2018)	Number successfully genotyped	Number young of year identified as stocked
2017	King (Queens and Stony creeks)	10,000	35	17	0
	Jamieson River	10,000	12	4	3
	Traralgon Creek	10,000	45	35	1* (*uncertain)

Table 1 Preliminary results of initial sampling in 2018.**

****Note Well: These data are cursory only. There were issues with the extraction of the DNA, and the small samples sizes mean the results are not statistically valid and therefore cannot be used to draw any conclusions at this stage. Further analysis is required before any trends can be identified.**

Where to from here?

It is early days in the trial and the trial is continuing. The trial is now into the second round with eggs again deployed in 2018. These streams will be sampled in early 2019.

There are two aspects of the stocking being investigated. The initial survival of fish hatched from the incubators and the long-term survival of these fish to contribute to the fishery and breeding population.

The first-round results are not conclusive either way due to the small sample size and therefore there is low confidence in the information. However, the sampling will be repeated next year in 2019 and will follow through the eggs stocked this year (2018).

The second aspect of the trials is to investigate the longevity of the stocked fish in the populations. The stocked fish can still be identified, no matter what age they are. Therefore, in the 2019 sampling, there will be DNA sampled from yearling fish as well as the smaller young of the year fish. This will provide not only an insight into the success of the Scotty Jordan incubators deployed in 2018, but also a second go at sampling the initial stocked fish.

Steps will be undertaken to rectify the DNA issue in the next sampling round due for early 2019. Potentially sampling at a later stage when then fish are larger and a larger biological sample can be taken. The samples will also be kept on ice.

As with many field based experiments there are many things that can go wrong. However, by running the trial a second year, and by repeating the work, we keep everything constant so that we are still in a good position to investigate the egg stocking trials.

The present results have been not ideal but there have been learnings and there is still opportunity to monitor the Scotty Jordan incubators.

- Fish stocked in 2018 can still be identified through DNA.
- Eggs have been deployed in 2018 and will be sampled in 2019
- Sampling round in 2019 will also sample yearling trout for analysis
- The sampling round will be delayed to a later time in the year so the fish are larger and a better DNA sample can be collected.
- The sample will be kept cold until delivered to the laboratory

Acknowledgements

The incubator trials have involved many people and the ATF would like to thank the volunteers who assisted in the delicate task of loading the eggs at Snobs Creek, and the subsequent installation of the incubators into the streams.

The great bunch of volunteers, more than 100 counting all tasks, in the main were representing the following clubs and organizations:

Australian Trout Foundation; Native Fish Australia; Mansfield and District Fly Fishing Club; Victorian Fly Fishing Association ; Council of Victorian Fly Fishing Clubs; Yarra Valley Fly Fishing Club; Southern Fly Fishing Club; Harrietville Angling Club; Alpine Fly Fishing Club; Kiewa Valley Angling Club; Bairnsdale Fly Fishing Club; Latrobe Fly Fishing Club; Sale Fly Fishing Club; Wangaratta Fly Fishing Club; Northern Fly Fishing Club; Goulburn Murray Fly Fishing Club; Undera Angling Club & VRFish, Neil Highett, Juuls Meusen, Brenda Galey, Werner Birkner and John Douglas admirably represented Victorian Fisheries Authority.

Lots of hard work mingled with lots of fun and laughter.

All Recreational anglers and clubs are welcome to be involved and to assist in the Jordan Scotty trials; please feel free to register your interest today at the ATF stand or visit www.atfonline.com.au.

Expanding the Angler Diary Program – GoFishVic App

Taylor Hunt
Victorian Fisheries Authority

Introduction

Monitoring our fisheries is important to understand and share their performance, identify any issues and what we can do to improve them.

In Victoria we estimate that there are over 200 waterways that support valuable trout fisheries. Unfortunately, it is not possible to survey and monitor all of these waterways, and this may limit the optimal management of their fisheries.

Anglers are increasingly using technology to record and share their fishing experience (Photo: Philip Weigall).

However recreational fishers are increasingly sharing their fishing experiences on social media from fishing trips right across the state. Social media groups on Facebook (for example 'Victorian Trout and Redfin Fishing') are used by thousands of anglers to share fishing catch and effort data and this information if harnessed, could greatly improve our understanding of how our fisheries are performing. The increasing use of smartphones, apps and social media by anglers provides new opportunities for us to establish innovative monitoring programs to improve fisheries management and recreational fishing for everyone!

Angler diary smartphone 'apps' are being trialled worldwide and show promise as a cost-effective and angler engaging method of collecting valuable recreational fishing catch and effort data. This information has been found to be scientifically robust, comparable to traditional monitoring methods like creel surveys, and it can provide high resolution real time information on many locations. In other words, it could be a gamechanger.

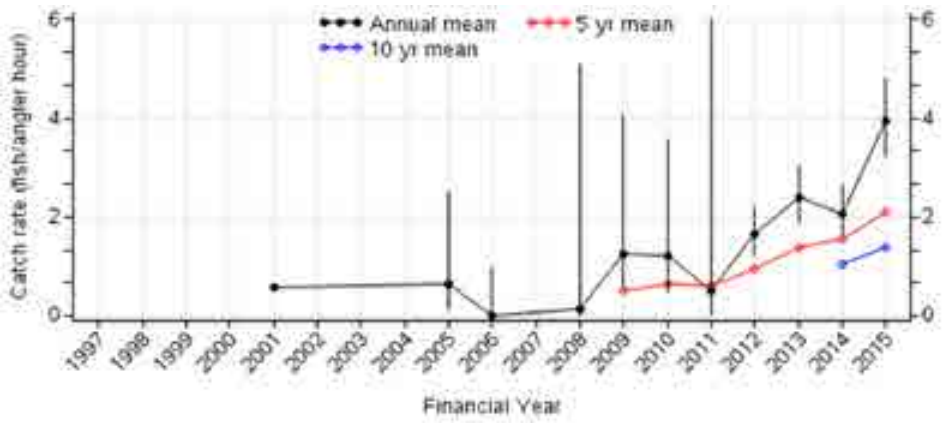
Angler Catch and Effort Data

In Victoria we have had fantastic experiences using citizen science programs to collect angler catch and effort data to inform management and improve our fisheries.

Collection and analysis of 6000+ angler catch and effort records from the Lake Purrumbete Angling Club showed strong relationships with stocking. The learnings led to improved stocking strategies and restored trophy trout and salmon fishing at the Crater Lakes.

Angler catch records helped restore trophy trout at the Crater Lakes (Photo: Declan Betts with a 14lb brown trout from Lake Purrumbete).

The Victorian Angler Diary Program has been operating for over 20 years with over 300 dedicated volunteer diary anglers recording their catch and effort data in marine bays and inlets. This valuable catch and effort information has been used to support stock assessments and improve management for black bream, dusky flathead and Australian Bass.



Volunteer diary anglers have provided information to improve their fisheries throughout Victorian bays and inlets (Images: Simon Conron).

The new era

Under the Victorian Government's Target One Million Plan to improve recreational fishing, the Victorian Angler Diary Program is being expanded via creation of a smartphone App - *GoFishVic*.

Target One Million
More Victorians fishing, more often

The *GoFishVic* App will make it easier for anglers to record their fishing activities and gather standardised recreational fishing catch and effort data, as a direct measure of the performance of our key recreational fisheries.

Measuring the performance of recreational fisheries will enable us to compare key fisheries and provide valuable insight to the effectiveness of various fishery management interventions such as regulations, fish stocking, habitat restoration, river flows etc.

The first version of the app (beta version) was released in July 2018 and will commence a journey of VFA working with anglers over the coming months to develop the app further. Updates to the app will include functions to upload photos, share catch results, show fishing history graphically and help angling clubs manage and promote events and attract membership.

The *GoFishVic* App will help improve your own trout fishing and trout fishing in Victoria (Photo: John Douglas).

Theme 3 – Trout on the hook

My trout fishing journey

Rex Hunt
Recreational fishing Advocate

As a young boy of some 10 years of age, Rex fell in love with trout fishing by peering through the windows of Hartley's Sport stores in the week leading up to trout opening.

As it is now, opening day was always the first Saturday in September. Those days the lakes were closed in the winter, just like the streams. Although in 1960, he had a couple of days trying prior to catching his first trout, in the Dandenong Creek of all places, Rex's trout journey started on opening morning in 1961, on the banks of the Macalister River, downstream from Lake Glenmaggie in Gippsland.

His first trout, a brown, was around the 2 pound mark in the old scale. The humble scrub worm on a running sinker rig did the trick. Later that day in the late afternoon in the middle reaches of the Traralgon Creek, Rex caught a second trout, this time a smaller brown of around a pound.

And so his trout fishing journey commenced.

Rex continued with his bait fishing using old favourites like worms and saltwater mussels, and when the time was right, mudeyes.

In 1968 he was introduced to spin fishing by his Goulburn River mentor Bob Gibb. In the same year he caught his first trout on a fly in the upper reaches of the Acheron River at Narbethong.

While Rex loves to fly fish, he still goes bait fishing and spin fishing if the conditions and area demand that style.

Rex will highlight his passion and knowledge of trout fishing in his presentation.

Yibbida Yibbida it will be fun

Lure tossing in South West Rivers

Mark Gercovich
Fishing journalist and expert angler

On September 2 2017 Victorian fisheries released a number of changes to their trout fishing regulations. Included in these changes was the Removal of the trout closed season for the Hopkins and Merri rivers. This winter season 2018 has been the first season the rivers have remained open in their entirety. There were a number of reasons for this.

- It allows for anglers to target the trout in what is the most productive time to fish these waters.
- These South West coastal rivers are reliant on annual fish stocking, with research showing very little if any natural recruitment, thus reducing the need to "lock up "the rivers to protect spawning fish at the best time to be fishing them .
- These productive waters have a reputation for growing large trout and opening up these waters during winter will increase participation and make a strong contribution to the local economy.

In this talk I will discuss these reasons and give some tips and hints on how to target the Brown trout in these waterways particularly over the cooler months.

For a number of years certain sections of the Merri and Hopkins (along with a few other South west rivers) had remained open for trout fishing due to their sea-run trout classification. This gave anglers the opportunity to target sea run trout in the time period/season that was seen as the most productive period to do so. True sea-runners though are quite rare and the majority of the fish taken are resident river fish that make their way down to the lower reaches during times of high flow.

Why is winter/closed season good ?

During the warmer months of the year trout fishing usually takes a back seat to the many other fishing options in the South west region. The rivers at this time of year take on the form of an elongated lake. Plenty of clear deep water, with minimal flow but plenty of food. This allows the trout to grow quite large as they can feed up heavily without having to travel too far as the extensive weed beds provide plenty of easily accessible tucker ,without having to battle the current. Despite being so close to a major town there is kilometers of both rivers that is fairly inaccessible. Private housing and farms line most of the bank. There is no boat ramp access to the upper Hopkins and only one ramp at the lower Merri. There is even not may accessible spots to even to put a canoe/yak in…the shallow runs/lava flows that I'll mention later make constant access to significant stretches of water difficult even to these small crafts. The good trout can be still taken in the clear water, mainly by bait fishing along the edge of the weed banks. Suspended below a slim-line float, mudeyes, gudgeon, galaxids and shrimp are the most popular baits. It is a very static form of fishing and doesn't cover much ground.

The first major change trout fishermen will be waiting for is the first serious autumn rains. The larger trout, that have been mainly a bait only prospect over the summer, become more aggressive as the spawning drive begins to stir within them. They also begin moving bringing fish closer to angler access points as they navigate there way

upstream from the comfortable inaccessible spot they have been living in for the past few months. The water is still usually very clear. Early morning dusk productive times particularly for lure anglers. Natural colored lures hard-bodied and plastic lures work best at this time. It is a good time of year to launch at the Merri ramp at Dennington and explore up river casting along the likely spots under electric power.

The next significant change comes when heavy consistent rains discolor the rivers. The dirty water is a different scenario, one that is particularly foreign to many trout anglers who would usually turn their back and go home if they encountered such discoloured water at their favourite trout stream. Despite being extremely brown, with little visibility, local trout thrive under these conditions feeding ravenously on disoriented baitfish, dislodged worms and drowned insects. Not only does this dirty water help the fish but it actually helps the angler. As stated previously despite fairly good stocking rates there are many kilometres of fairly inaccessible river where the trout can go about their existence with little angling pressure. For most of the year these rivers have fairly insignificant flow, yet a good supply of food. The trout can spend most of the year cruising around the deep pools and growing more like lake trout would. However once the rain comes the river environment changes and the trout begin to behave more like river trout, holding in shallow runs and riffles where fish can hide behind rocks out of the current waiting for food to come past. It allows for an angler to you stream fishing skills and techniques but with the chance of catching trout more of the proportions expected by lake anglers. This tends to concentrate the fish in certain areas. The Hopkins River in particular is cris-crossed by a number of ancient lava flows. These were discussed previously as barriers to canoeing and yakking in the times of low flow, but now they act as trout and angler attracting beacons. The Merri's obstructions come in more man made forms in the lower reaches, such as bridges and weirs. It does also has a number of shallow rock run areas that attract fish during the times of high water flow.

Of course with minimal visibility and plenty of (dirty) water between fish you need to identify likely holding positions and fish them thoroughly. It can often take several casts to a productive looking holding location before the lure passes that position that draws a strike from a fish. Look for shallow runs and riffles where fish can hold behind rocks, foamy backwaters, anywhere where the fish can lie in ambush out of the main river flow. In fact most of the time you find the fish right at your feet, hiding next to a rock or an undercut bank. Many fish get caught by simply running the lure close to these structures without even opening the bail arm sometimes. For anglers used to a lake fishing scenario and casting long into the distance this can be hard to get your head around. Casting out constantly into the fast flowing middle of the river is often a waste of effort. It also goes without saying that even though the water is dirty a little bit of stealth with your approach is important given your quarry may be positioned right next to where your last footstep is taken.

Apart from the odd escape rainbow, the local trout are browns and brown trout are renowned as being the more fussy and elusive of the pair. , Big brown's don't get big by being dumb, but dirty water shifts things back a little in the anglers favour. Big browns love to feed under the cover of first and last light and at night. However the dirty water provides them with cover that gives them the confidence to feed and stay in those shallow feeding areas throughout the day. During these cooler wetter months an angler can spend the day exploring/fishing away and always be in with a chance no matter what hour it is. At other times of the year with low light periods being the prime time it does restrict the available amount of productive time to catch a fish. Of course the other great

thing about fishing the winter months is no snakes. Bashing through long grass and nice sun warmed rocks isn't something that's a lot of fun to me…particularly if I could be catching plenty of different species elsewhere locally.

The region also receives its fair share of rain, even in this past decade of poor falls for other areas state. It seems the more high water/ flood events that occur the better conditioned fish the fish become. Stocking rates have been quite low in the Hopkins , particularly given it's size and length. This allows large trout to have plenty of river to call their own and continue to grow, particularly as access to many sections of the local river banks is difficult. The past two seasons have seen an increase in number of fish stocked in both the Hopkins and the Mt Emu River (which is attached to the Hopkins) I'm sure it won't have any effect on the quality of the fish as there is plenty of habitat and food to support a few more fish.

Techniques

There is abundant forage fish species in the local waterways to assist the trout to grow quickly. Various species of Galaxias minnows and gudgeon, along with small mullet closer to the estuary, combine to provide plenty of accessible feed for large trout. Most techniques for catching these trout locally are based on this piscatorial diet. Large minnow style lures from 6 cm right up to 11cm are the weapon of choice for most anglers with paddle tail soft plastics and large dark wet flies also popular. I have been having great success recently with the Daiwa TD minnows particularly the larger 9cm version in the dirty water, swapping back to the 6cm as the waters clear. Shallow running hard bodies are usually preferred but the Daiwa Double clutch 65s and 95s also work well if you need something with just a little more diving depth. In the dirty water style paddle tailed soft plastcis are a very effective way of targeting trout as well. These lures send out a subtle but effective vibration that helps the ambushing trout locate the lure going past in the dirty water. One of the accepted advantages of using a soft plastic lures is that fish hold on for longer than a less natural feeling hard body. This becomes important when fishing fast running water. It isn't always easy to keep constant feel on a lure when casting into fast flowing water and letting the lure rise and fall over and around structure. A trout can hold onto a soft plastic for that split second it takes you to regain touch as you take up the belly in the line. A trout hitting a hard body lure at that time and not hooking up may not even be felt by the angler. As well as missing the chance to set the hooks the angler also doesn't know the fish was even there. Therefore he may not put in those few extra casts to that area where the fish was holding, and in the dirty water it often takes several casts to the one area to achieve a result. Fly anglers are using wet flies at this time with larger dark colored heavily hackled patterns most productive. Due to the factors of dirtier water, largish lures, bigger fish and the fact you are fishing around water diverting obstructions like shallow rocks and snags , means you use heavier leaders than you would usually associate with trout fishing. I find 8/10lb leaders are my starting point and slightly heavier rather than lighter would be the next move if a change was required.

Conclusion

I did enjoy the opening morning feeling of hitting the sections of the Hopkins and Merri that had been closed. The smaller sections that remained open did cop a fair bit of angling pressure and by the end of the season it was great to be able to have the anticipation of fishing new water. However that feeling is tempered now by being able to fish a far wider expanse of water any time during the winter season, when many other fishing options are a wipe-out due to the weather conditions. There's nothing better than rugging up for a winter wander along a local river with the prospect of tangling with a big brown right at your feet.

Feathers & flies – Tips from a trout fishing guide

Philip Weigall
Flystream.com

1. **Think about where to go – really think.**
2. **Don't ignore player comfort.** Sounds prissy, but if you're too hot, too cold, your polaroids are too dark, or the mossies are eating you alive, or your fingers are so frozen they don't work, or you're hungry or thirsty, you're behind before you even start. The only distraction should be the fish – not how uncomfortable your wading boots are, or how you keep slipping over in the lakeside mud.
3. **Learn to tie leader-to-tippet knots, and tippet-to-fly knots** until you can do them in your sleep with frost-bitten fingers.
4. **Once on the water, think about what trout really want:** basically a food profit, and not being eaten. Mostly, they will be holding or cruising in places that give them both – which may or may not be where it's convenient for you, because trout don't really care about angler convenience.
5. **Learn to cast fast, to cast accurately and to cast off either shoulder.** Don't worry too much about distance.
6. As Rob Meade says, we're puppeteers. I could almost talk about this and nothing else. If flyfishers **worried less about fly choice, and more about what their fly is doing,** trout guides would be just about out of business! When a group of guides get together for a recreational fish, they don't talk fly minutae. They might say, 'We're getting them on small dries / big dries / big wets' etc. What they will talk about in detail, is the where and how – 'they're right on the edges / fishing deep and slow' etc.
7. **If in doubt, for god's sake, strike!** Flies taste horrible. I've tried hundreds and they're disgusting. Glue, dead animal fur, metal… Pretty much as soon as a fish eats your fly, it's going to spit it out again. Your job is to beat them to it!
8. **Land the fish.** If you like being broken off or don't care about being broken off, this part of the talk is a good time to have a nap.
9. **Never stop learning.** Techniques, gear, flies and – especially – spots, are always changing. Sometimes, the latest and greatest of all of the above can prove to be fool's gold – but sometimes not.
10. I may be contradicting myself a little here, but above all, **have fun.** We're not at war with the fish, so if you're not enjoying yourself, stop and change to something you do enjoy. I have a good friend who's one of Australia's – if not the world's – best nymph fishers. But guess what? When he's not competition fishing and we're just having a fish together, he only wants to fish dry flies. Never mind that he might be able to catch 10 on nymphs to 1 on the dry, if there's even a chance he can bring a fish up to dry, that's what he wants to do. Now, I love catching trout on the nymph and the skill of it, but I sort of get and appreciate his point. He wants to have fun, and for him, a trout eating a dry is as fun as it gets.

'Working together to build community awareness, understanding and action that will enrich our fisheries into the future.'

Anthony Forster

Victorian Fisheries Authority

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