



Otago
Regional
Council

Flow naturalisation of the Pomahaka River

Otago Regional Council
Private Bag 1954, Dunedin 9054
70 Stafford Street, Dunedin 9016
Phone 03 474 0827
www.orc.govt.nz

© Copyright for this publication is held by the Otago Regional Council. This publication may be reproduced in whole or in part, provided the source is fully and clearly acknowledged.

ISBN

Report writer: Lu Xiaofeng

Data and statistical analyses performed by: Lu Xiaofeng

Reviewed by: Dave Stewart, Raineffects Ltd

Completed: June 2023

Published: November 2023

Contents

Daily flow time series data for Pomahaka River.....	3
Daily water use time series	5
Total water use above the Burkes Ford recorder on the Pomahaka River	5
Flow naturalisation.....	6
Method.....	6
Naturalised flow Statistics.....	6
Appendix.....	7

This document describes how naturalised flow statistics at the current flow recorder on the Pomahaka River at Burkes Ford were derived.

Daily flow time series data for Pomahaka River

The daily flow time series data available in the Pomahaka catchment are listed in **Table 1**. The locations of the flow sites are shown in **Figure 1**. The current consents used for flow naturalisation (shown in **Figure 1**) are listed in **Table 3** in the HTML file in the **Appendix**.

Table 1: The daily flow time series data available for the analysis above the Burkes Ford flow site on the Pomahaka River.

Site	Start	End	Length (year)
Pomahaka at Burkes Ford	4/08/1961	24/06/2023	61.9
Pomahaka at Glenken	30/06/1992	24/06/2023	31.0
Pomahaka at Hamiltons Flat	7/11/1995	5/11/1996	1.0
Waipahi at Waipahi	4/07/1996	24/06/2023	27.0
Waikoikoi Creek at Conical Hill Road	15/07/2008	18/11/2009	1.3
Heriot Burn at Park Hill Road	25/10/2012	24/06/2023	10.7
Crookston Burn at Kelso Road	15/07/2008	17/11/2009	1.3
Leithen Burn at Leithen Road	17/09/2008	17/11/2009	1.2
Heriot Burn at SH90	17/09/2008	22/11/2011	3.2
Spylaw Burn at Hukarere Station Road	23/09/2008	17/11/2009	1.2
Wairuna at Millar Road	15/07/2008	24/06/2023	14.9
Washpool Stream at Kilhastie Road	15/07/2008	18/11/2009	1.3

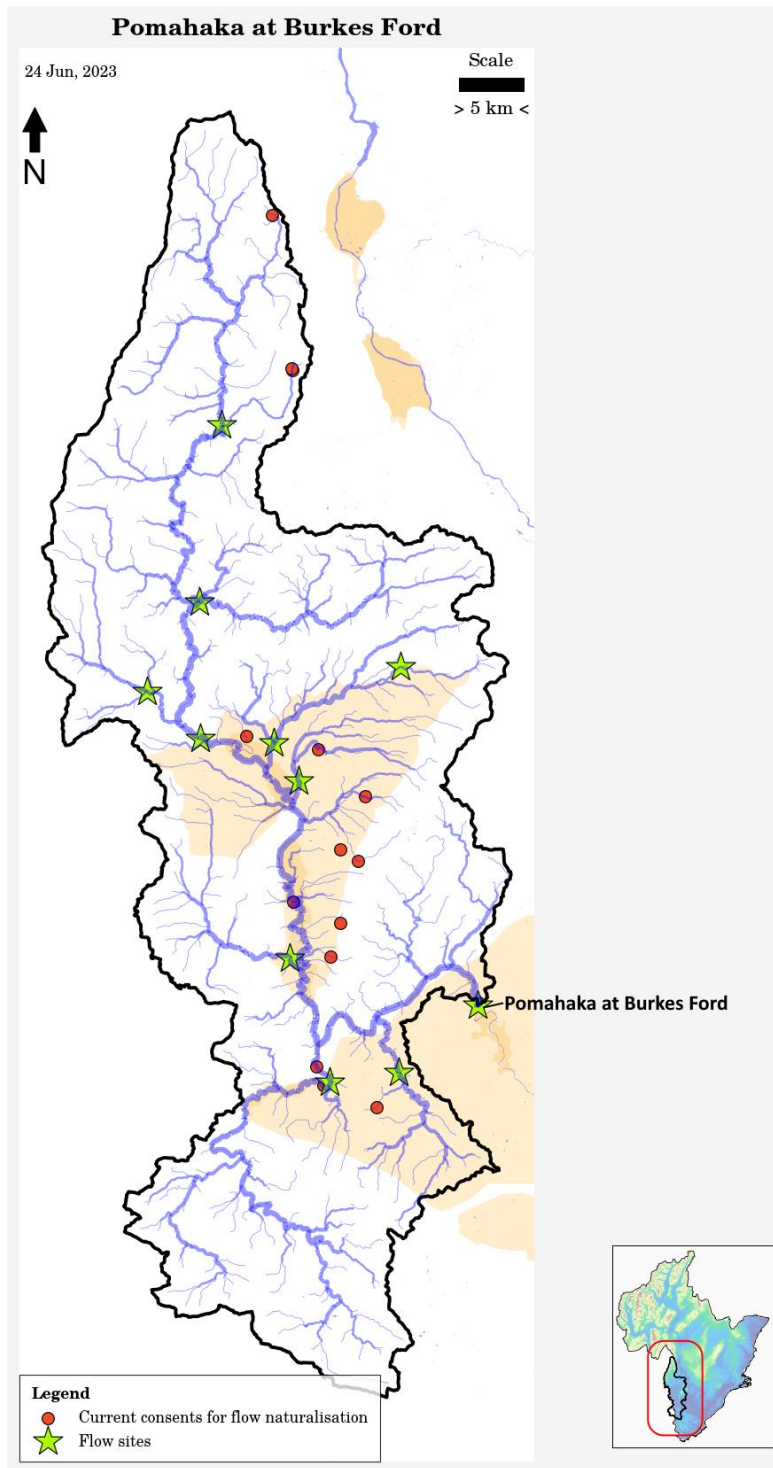


Figure 1: The location of flow recorders and current consents above the Burkes Ford flow site on the Pomahaka River.

Daily water use time series

Time series data of water use (WU) is used to naturalise the flow at the Burkes Ford flow recorder. All consents above the flow recorder must first be identified.

Total water use above the Burkes Ford recorder on the Pomahaka River

Altogether 95 consents have been issued on the Pomahaka River above the Burkes Ford recorder. However, after removing consents which do not affect flow, 591 consents are used in the flow naturalisation process (See Table 3 in the HTML file listed in the Appendix). As shown in the table, 16 are currently active. Figure 2 shows the total water use (WU) regime above Burkes Ford.

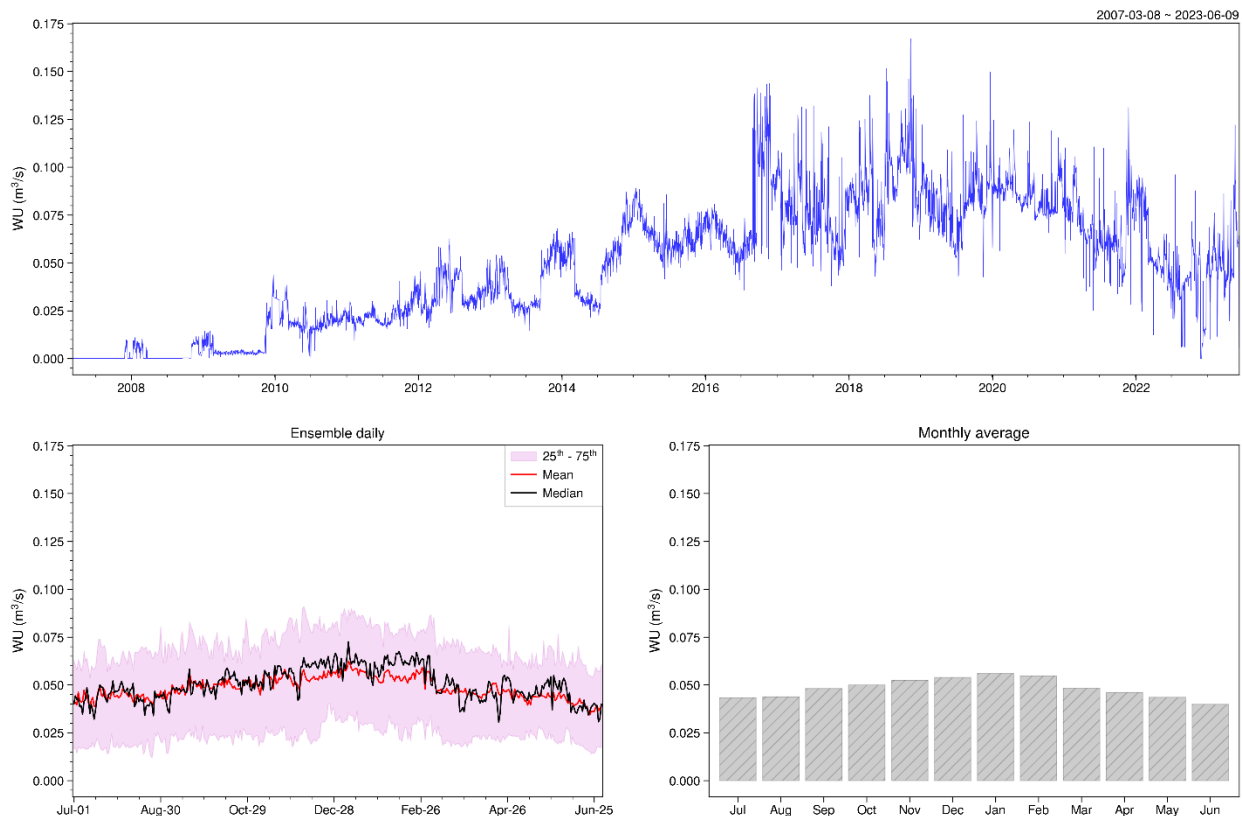


Figure 2: The total water use upstream of the recorder at Burkes Ford on the Pomahaka River.

¹ 59 consents used in this study are listed in **Table 3** in the HTML file listed in the **Appendix**. They are the consents left by filtering out:

- Groundwater takes with no effect on the nearby water body (refer to the attribute of *Stream depletion rate*)
- Non-consumptive takes
- Retakes

As shown in **Figure 2**, the water is used across the whole year with various purposes, such as rural water supply, irrigation, domestic use, and stockwater. The pattern of water use in Figure 2 reflects the multi-use of the water in this catchment and water use is not dominated by irrigation abstraction.

The total WU time series after the water year 2013/14 is used in this study. Since 2013/14, the mean water use across the whole year is 69 L/s.

Flow naturalisation

This section describes how the naturalised flow statistics are estimated at the Burkes Ford flow recorder on the Pomahaka River.

Method

The naturalised flow time series can be estimated by adding the upstream total WU to the observed flow records.

This study's key goal is to produce long-term flow statistics, including the naturalised seven-day mean annual flow (7dMALF) and long-term median and mean flows for the flow recorder at Burkes Ford.

Naturalised flow Statistics

Basic flow statistics (Table 2).

Table 2: Naturalised flow statistics for the Burkes Ford recorder on the Pomahaka River (01/07/2013 - present).

Site	Mean (m³/s)	Median (m³/s)	FRE3² (year⁻¹)	7dMALF (m³/s) (Jul - Jun)
Pomahaka at Burkes Ford (observed)	25.255	16.411	7.9	3.455
Pomahaka at Burkes Ford (naturalised)	25.376	16.540	7.8	3.521

² The frequency of events exceeding three times the median flow value. In this study, an independent event is defined by a minimal event interval of 7 days.

Appendix

The complete list of all consents used in this analysis can be found in **Table 3** in [the HTML file](#).