

Appendix I - McDougall Creek

APPENDIX I

Okanagan Basin Water Board Okanagan Nation Alliance B.C. Ministry of Forests, Lands and Natural Resource Operations

McDougall Creek



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APPENDIX I

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1 Introduction

The purpose of this appendix is to provide information to support the application of recommended environmental flow needs (EFN)-setting methods for McDougall Creek following the methods outlined in the accompanying report¹. This document contains information obtained and collated by Associated Environmental Consultants Inc. (Associated) and will be revised following additional input from Okanagan Nation Alliance. A summary of current available information for McDougall Creek is provided in Table 6-1 in the accompanying report and Table I-1 at the end of this appendix.

Section 5 in the accompanying report provides an overview of two recommended EFN-setting methods for tributaries within the Okanagan Basin, while Section 6 lists the key steps to implement each of the two methods, in both flowchart and text form.

McDougall Creek is included in the District of Kelowna Master Drainage Plan (RSB Engineering 2011a). An overview of the McDougall Creek watershed, as well as infrastructure within the watershed, stream characteristics, and aquatic habitat is provided by RSB Engineering (2011a).

Environmental flows have been previously recommended for McDougall Creek by ESSA and Solander (2009) (Table 6-1 in the accompanying report).

2 Relevant Information for Setting Environmental Flow Needs

This section summarizes the information available to support EFN-setting in McDougall Creek. Available information sources for McDougall Creek are included within Table I-1 at the end of this appendix.

2.1 OVERVIEW OF THE WATERSHED

McDougall Creek has a watershed area of approximately 53 km². The watershed is located on the west side of Okanagan Lake near West Kelowna (Summit 2009). The creek drains a small area of plateau above 1,200 m before flowing through a small downcut valley with steep side slopes (Summit 2009). The lower reaches of the creek cross a gently sloped terrace through Westbank First Nation reserve land (Summit 2009). The watershed includes approximately 0.68 km² of irrigated agricultural land (generally within the lower reaches); however, much of these lands are being developed for commercial and residential uses (Dobson 2008).

The McDougall Creek watershed is shown in Figure 1-1 in the accompanying report.

¹ Associated Environmental Consultants Inc. (Associated). 2016. Collaborative Development of Methods to Set Environmental Flow Needs in Okanagan Streams. Working Document, Current Version. Prepared for the Okanagan Basin Water Board, Okanagan Nation Alliance, and B.C. Ministry of Forests, Lands and Natural Resource Operations. May 2016

2.2 STREAMFLOWS

2.2.1 Hydrometric Data

There are currently no active Water Survey of Canada (WSC) hydrometric stations within the McDougall Creek watershed; however, historic records are available from the following hydrometric station:

- **McDougall Creek near Westbank** (WSC 08NM014; Drainage area: 48.9 km²; Regulated; Period of record: 1920-1926)

2.2.2 Naturalized Streamflows

Figure 6-1 in the accompanying report highlights the necessity of producing hydrographs under natural conditions and under actual, licensed, and future proposed water use conditions. *nhc* (2001) and Summit (2009) provided naturalized streamflow estimates for McDougall Creek at the mouth. In addition, as part of the Okanagan Water Supply and Demand Project, net and naturalized flows were modelled for the majority of Okanagan tributaries, including McDougall Creek (Summit 2010). Figure 2-1 provides a summary of the modelled mean weekly net and naturalized streamflows for McDougall Creek at the mouth for 1996-2006 (i.e., the model calibration period).

Phases 2 and 3 of the Okanagan Water Supply and Demand Project included modeling of multiple future scenarios for the Okanagan Basin, which considered projected climate change, population growth, change to irrigation efficiencies, and other factors. Net and naturalized streamflow outputs for McDougall Creek at the mouth are available for each future scenario.

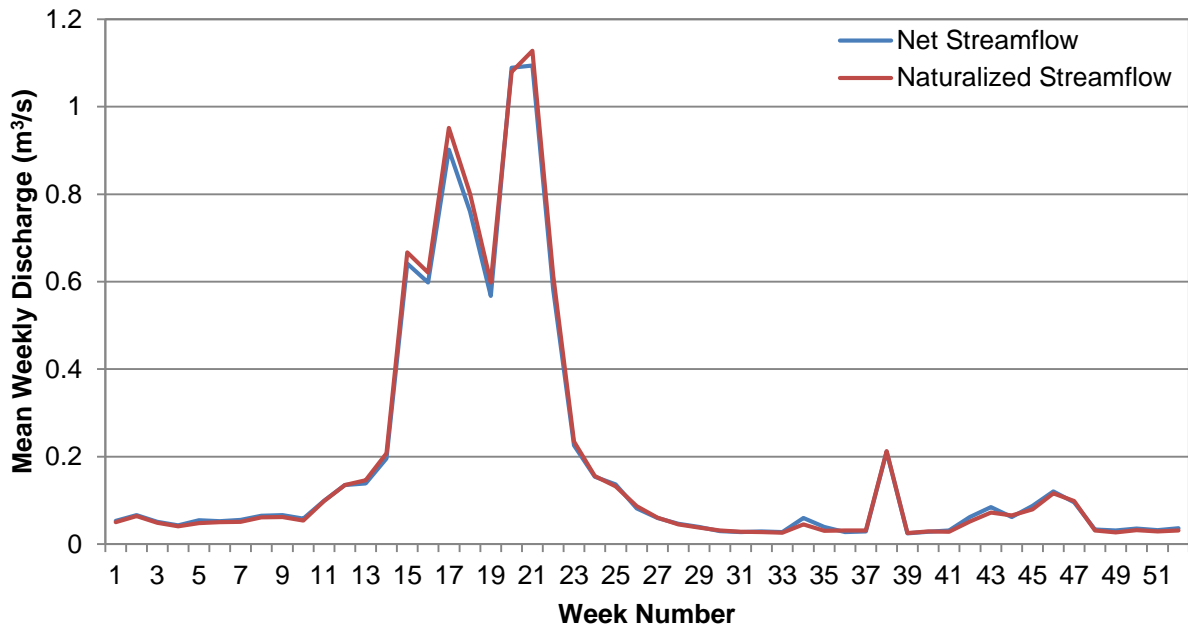


Figure 2-1

Mean weekly net and naturalized flows for McDougall Creek at the mouth, 1996-2006 (Summit 2010)

2.3 FISH AND AQUATIC HABITAT

Summit (1996) reported that McDougall Creek is an important rainbow trout producing stream, but does not appear to support a spawning Kokanee population. Summit (1996) also identified that the primary risk to fish habitat within the watershed was the condition of the road network, including culverts and bridges at crossing locations, as well as sedimentation and stability concerns throughout the watershed.

No fish barriers were reported for McDougall Creek watershed; however, Summit (1996) reported that the mouth of the creek (as it flows over the shore of Okanagan Lake) is a limiting factor for fish migration between Okanagan Lake and McDougall Creek.

RSB Engineering (2011b) completed sensitive habitat inventory and mapping (SHIM) along portions of McDougall Creek (Table 6-1 in the accompanying report).

Since current (and potentially historic) aquatic habitat information is important for developing an EFN flow regime, it is recommended that up-to-date aquatic habitat information be obtained from publically available databases at the time of investigation.²

² Aquatic habitat information, including fish barriers can be obtained from the Government of B.C. Habitat Wizard: <http://www.env.gov.bc.ca/habwiz/>.

2.3.1 Current and Historical Fish Species Presence

Rainbow trout are the only fish species reported to be found within McDougall Creek watershed (ESSA and Solander 2009). Summit (1996) documented rainbow trout presence within the lower 12 km of McDougall Creek, as well as the lowest 400 m of Carrot Creek (a tributary to McDougall Creek).

Whitman and Taylor (1978) concluded that McDougall Creek has insufficient flows to support fish in the lower reaches during autumn and does not appear to support a spawning kokanee salmon population.

Since current (and potentially historic) fish presence information is important for developing an EFN flow regime, it is recommended that up-to-date fish presence information be obtained from publically available databases at the time of investigation.³

2.3.2 Fish Periodicity and Habitat Suitability

No stream-specific fish periodicity or habitat suitability indices have been determined for McDougall Creek (Table 6-1 in the accompanying main report). However, Appendix E of the accompanying report provides information on species-specific life stage periodicities for the Okanagan Basin, as well as habitat suitability index (HSI) curves for select species. The information within Appendix E should be used at a minimum to support EFN-setting for McDougall Creek.

2.4 WATER USE AND STORAGE

The City of West Kelowna (Lakeview Service Area) and the Westbank First Nation (WFN) are the two main water suppliers within the McDougall Creek watershed (Dobson 2008).

Summit (2010) provides an estimate of actual surface water use within the McDougall Creek watershed for 1996-2006 in Appendix C of the Okanagan Water Supply and Demand Project – Phase 2. The actual mean annual surface water use over 1996-2006 was estimated to be 365 ML.

2.4.1 Storage Reservoirs

McDougall Creek has private storage on two headwater reservoirs: Hidden Lake and Hayman Lake (Dobson 2008). The total developed storage for both reservoirs is 313 ML and the stored water is used to supplement low flows within McDougall Creek and to irrigate private lands (Dobson 2008).

2.4.2 Water Licences and Major Points of Diversion

The City of Kelowna diverts water from Lambly Creek into Rose Valley Reservoir and then distributes water throughout the McDougall Creek watershed (Summit 2009).

³ Fish presence information can be obtained from the Government of B.C. Fish Inventory Summary System Database Query: <http://www.env.gov.bc.ca/fish/fiss/>.

At present, there are 57 current water licences within the McDougall Creek watershed. Since knowledge of current water licences is critical in developing EFN flow regimes, it is recommended that up-to-date water licence information be obtained at the time of investigation.⁴

2.4.3 Interbasin Transfers

Stored water in Hidden Lake and Hayman Lake at the headwaters of McDougall Creek (Node 26) is used to irrigate private lands in the watershed and supplies water to Shannon Lake (Dobson 2008).⁵ Shannon Lake (Node 27) is the source of water for Shannon Lake Golf Course (Dobson 2008).

2.5 GROUNDWATER AND SURFACE WATER INTERACTION

Summit (2009) identified that McDougall Creek likely loses water to groundwater and estimated that streamflow is lost to groundwater at a rate of 0.014 m³/s per km of channel on the alluvial fan (Section 3.6 of Summit 2009).

2.6 TRADITIONAL KNOWLEDGE

The current version of this document does not include presentation of any Okanagan Nation Traditional Knowledge. However it is anticipated that a future revision will include such information, as well as potentially other technical information held by the Okanagan Nation Alliance Fisheries Department.

⁴ Water Licence Information can be obtained from the Government of B.C. Water Licences Query: http://a100.gov.bc.ca/pub/wtrwhse/water_licences.input.

⁵ The geographic location of residual areas and water use areas can be found on Figure 1.1 in Dobson (2008), and Maps 1 and 3 in Summit (2010).

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