

Appendix S - Shuttleworth Creek

APPENDIX S

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

Shuttleworth Creek



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APPENDIX S

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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 Shuttleworth 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 Shuttleworth Creek is provided in Table 6-1 in the accompanying report and Table S-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.

Environmental flows have been previously recommended for Shuttleworth 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 Shuttleworth Creek. Available information sources for Shuttleworth Creek are included within Table S-1 at the end of this appendix.

2.1 OVERVIEW OF THE WATERSHED

Shuttleworth Creek has a watershed area of approximately 90 km². The forested plateau headwaters of Shuttleworth Creek lie to the southeast of Skaha Lake. Shuttleworth Creek flows through an incised canyon before discharging into the Okanagan River just south of Okanagan Falls. The main land use within the watershed is agriculture and urban development along the lower reaches of the creek, around the community of Okanagan Falls.

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

2.2 STREAMFLOWS

2.2.1 Hydrometric Data

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

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

- **Shuttleworth Creek near Okanagan Falls** (WSC 08NM006; Drainage area: 85.2 km²; Regulated; Period of record: 1921-1964)
- **Shuttleworth Creek near the Mouth** (WSC 08NM149; Drainage area: 89.9 km²; Regulated; Period of record: 1969-2010)

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. Summit (2009) provided naturalized streamflow estimates for Shuttleworth 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 Shuttleworth Creek (Summit 2010). Figure 2-1 provides a summary of the modelled mean weekly net and naturalized streamflows for Shuttleworth 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 Shuttleworth Creek at the mouth are available for each future scenario.

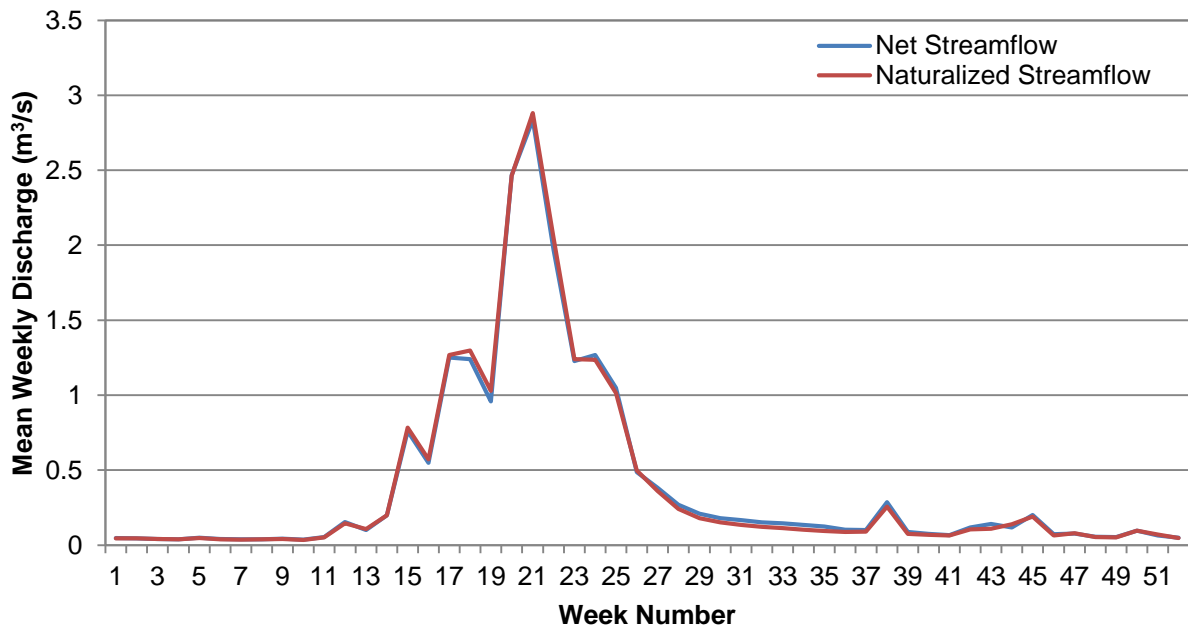


Figure 2-1
Mean weekly net and naturalized flows for Shuttleworth Creek at the mouth, 1996-2006 (Summit 2010)

2.3 FISH AND AQUATIC HABITAT

Grainger (2011) completed a fish passage culvert assessment within Shuttleworth Creek, documenting one rock weir which presented a barrier to fish migration. In addition, ONA (2006) documented one rock weir located approximately 30 m upstream from the mouth of Shuttleworth Creek which presented a partial barrier to fish migration.

No sensitive habitat inventory and mapping (SHIM) has been completed for Shuttleworth Creek (Table 6-1 in the accompanying main 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

2.3.1 Current and Historical Fish Species Presence

Fish species found in Shuttleworth Creek include rainbow trout and longnose dace (ESSA and Solander 2009).

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 developed for Shuttleworth 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 Shuttleworth Creek.

2.4 WATER USE AND STORAGE

Okanagan Falls Irrigation District (OKID) is the main water purveyor within the Shuttleworth Creek watershed. However, due to the lack of storage within the watershed, the majority of water use is sourced from surrounding areas, outside of the watershed (Section 2.4.3).

Summit (2010) provides an estimate of actual surface water use within the Shuttleworth 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 152 ML.

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/>.

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/>.

2.4.1 Storage Reservoirs

There is no developed storage within the Shuttleworth Creek watershed (Dobson 2008 [included in Summit 2010]).

2.4.2 Water Licences and Major Points of Diversion

At present, there are 13 water extraction licences within the Shuttleworth 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

OKID supplies water to users within the Shuttleworth Creek watershed from groundwater wells located within the surrounding areas (Dobson 2008).

2.5 GROUNDWATER AND SURFACE WATER INTERACTION

Summit (2009) identified that Shuttleworth 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.

References

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