

**Appendix G - Equesis Creek**

## APPENDIX G

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

#### Equesis Creek



May 2016

ISO 9001 and 14001 Certified | An Associated Engineering Company

# APPENDIX G

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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 Equisis Creek following the methods outlined in the accompanying report<sup>1</sup>. 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 Equisis Creek is provided in Table 6-1 in the accompanying report and Table G-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 Equisis Creek by Koshinsky (1972), Shepherd and Ptolemy (1999), nhc (2001), and 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 Equisis Creek. Available information sources for Equisis Creek are included within Table G-1 at the end of this appendix.

### 2.1 OVERVIEW OF THE WATERSHED

Equisis Creek has a watershed area of approximately 204 km<sup>2</sup>. Equisis Creek flows from its headwaters at Pinaus Lake to the northwest arm of Okanagan Lake. There are several lakes in the watershed, including Lady King Lake, Pinaus Lake, Little Pinaus Lake, and Square Lake (Dobson 2001). Due to the steep topography of the watershed, land use is predominately forestry and there is a small amount of agricultural land present. Equisis Creek flows through Okanagan Indian Reserve No. 1 in the lower reaches.

The Equisis 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 Equisis Creek watershed; however, historic records are available from the following hydrometric stations:

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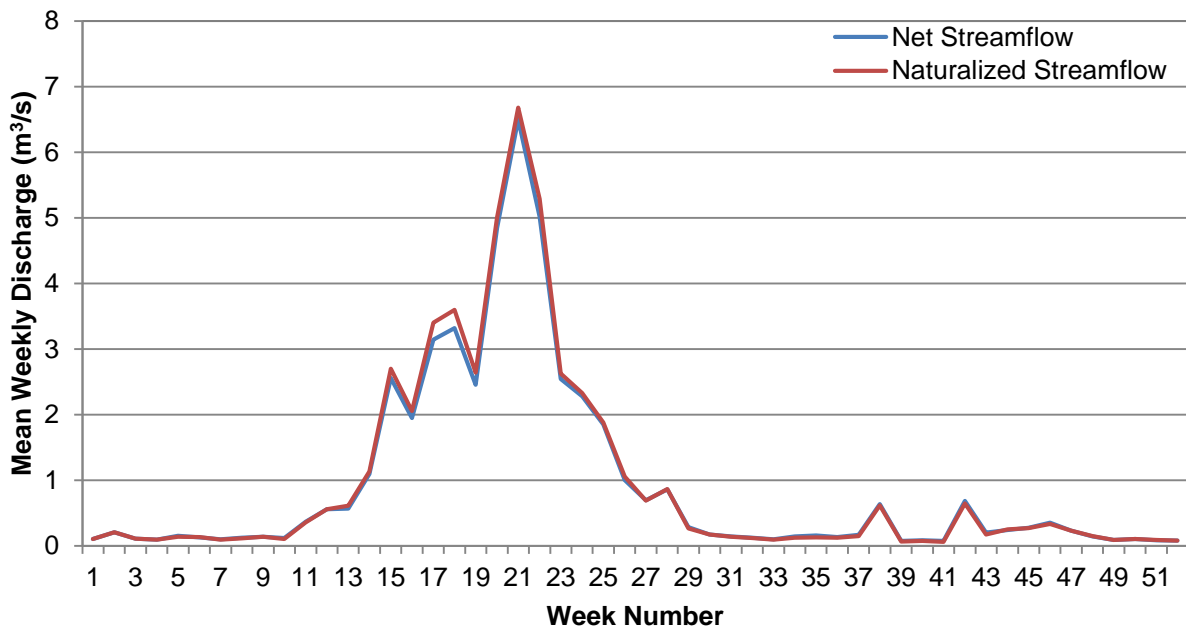
<sup>1</sup> Associated Environmental Consultants Inc. (Associated). 2016. Collaborative Development of Methods to Set Environmental Flow Needs in Okanagan Streams. Working document, Current Version. Prepared for the Okanagan Basin Water Board, Okanagan Nation Alliance, and B.C. Ministry of Forests,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

- **Ewer Creek near the Mouth** (WSC 08NM176, Drainage area: 52.8 km<sup>2</sup>, Natural; Period of record: 1971-1986)
- **Equesis Creek near Vernon** (WSC 08NM024; Drainage area: 179 km<sup>2</sup>; Regulated; Period of record: 1921-1926)
- **Equesis Creek near the Mouth** (WSC 08NM161; Drainage area: 199 km<sup>2</sup>; Regulated; Period of record: 1969-1982)

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



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

## 2.3 FISH AND AQUATIC HABITAT

Fisheries values within Equesis Creek are considered moderate (Swain 1994). Dobson (2001) completed an Interior Watershed Assessment for Equesis Creek watershed, providing information on channel conditions, fish barriers, and aquatic habitat. In addition, Dobson (2005) provided information on riparian vegetation and function along portions of the Equesis Creek channel and Wildstone Resources Ltd. (1997) provided information on fish habitat throughout portions of Equesis Creek.

Rainbow trout have been reported throughout the mainstem of Equesis Creek and have been identified to spawn in the lower reaches of the creek (Wildstone Resources Ltd. 1997). Kokanee salmon from Okanagan Lake have also been reported to spawn within the lower reaches of Equesis Creek (Wildstone Resources Ltd. 1997).

Summit (2000) identified four weirs on the lower mainstem of Equesis Creek that act as barriers to fish migration. In addition, Wildstone Resources Ltd. (1997) identified that the presence of beaver dams in the lower reaches of the creek limit kokanee salmon access to spawning habitat.

No sensitive habitat inventory and mapping (SHIM) has been completed for Equesis 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.<sup>2</sup>

### 2.3.1 Current and Historical Fish Species Presence

Fish species found in Equesis Creek include rainbow trout, kokanee salmon, prickly sculpin, and yellow perch (ESSA and Solander 2009). Pinaus Lake has been stocked with rainbow trout since 1949 and the stocked trout have been reported to spawn within two small tributaries to the lake, as well as within the outlet stream between Pinaus and Little Pinaus Lakes (Wildstone Resources Ltd. 1997).

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.<sup>3</sup>

### 2.3.2 Fish Periodicity and Habitat Suitability

No stream-specific fish periodicity or habitat suitability indices have been determined for Equesis Creek (Table 6-1 in the accompanying main report). However, Appendix E of the accompanying report provides information on salmonid species-specific life stage periodicities for the Okanagan Basin, as well as habitat

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

<sup>3</sup> 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/>.

suitability index (HSI) curves for select species. The information within Appendix E should be used at a minimum to support EFN-setting for Equisis Creek.

## **2.4 WATER USE AND STORAGE**

Summit (2010) provides an estimate of actual surface water use within the Equisis 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 5 ML.

### **2.4.1 Storage Reservoirs**

The Okanagan Indian Band and the B.C. Ministry of Environment jointly manage Pinaus Lake to supplement streamflows downstream of the lake when required (Dobson 2008).

### **2.4.2 Water Licences and Major Points of Diversion**

At present, there are 57 current water extraction licences within the Equisis 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.<sup>4</sup>

### **2.4.3 Interbasin Transfers**

Although there are no direct diversions of water into or out of the watershed, the Okanagan Indian Band extracts water from Equisis Creek and distributes it not only in the Equisis Creek watershed, but also in Residual Area E-1 (Node 7) and Residual Area W-3 (Node 9) (Dobson 2008 [included in Summit 2010])<sup>5</sup>.

## **2.5 GROUNDWATER AND SURFACE WATER INTERACTION**

nhc (2001) reports that Equisis Creek is potentially groundwater influent. However, Summit (2009) reports that there is likely no net loss or gain of streamflow to or from groundwater (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.

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<sup>4</sup> 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](http://a100.gov.bc.ca/pub/wtrwhse/water_licences.input).

<sup>5</sup> The geographic location of the 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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