

Appendix O - Penticton Creek

APPENDIX O

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

Penticton Creek



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APPENDIX O

Table of Contents

SECTION	PAGE NO.
Table of Contents	i
1 Introduction	O-1
2 Relevant Information for Setting Environmental Flow Needs	O-1
2.1 Overview of the Watershed	O-1
2.2 Streamflows	O-1
2.3 Fish and Aquatic Habitat	O-3
2.4 Water Use and Storage	O-4
2.5 Groundwater and Surface Water Interaction	O-5
2.6 Traditional Knowledge	O-5
References	

1 Introduction

The purpose of this appendix is to provide information to support the application of recommended environmental flow needs (EFN)-setting methods for Penticton 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 Penticton Creek is provided in Table 6-1 in the accompanying report and Table O-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 Penticton Creek by Koshinsky (1972), nhc (2001), and ESSA and Solander (2009) (Table 6-1 in accompanying report).

2 Relevant Information for Setting Environmental Flow Needs

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

2.1 OVERVIEW OF THE WATERSHED

Penticton Creek has a watershed area of approximately 180 km². The Penticton Creek watershed lies to the northeast of the City of Penticton and drains into Okanagan Lake at Penticton. The main tributaries to Penticton Creek include James, Reed, Municipal, Harris, and Steward Creeks. Land use activities in the lower watershed include agriculture and urban development, while forestry occurs in the upper portions of the watershed.

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

2.2 STREAMFLOWS

2.2.1 Hydrometric Data

There are currently three active Water Survey of Canada (WSC) hydrometric stations within the Penticton Creek 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

- **Two Forty Creek near Penticton** (WSC 08NM240; Drainage area: 4.94 km²; Natural; Period of record: 1983-Present)
- **Two Forty-One Creek near Penticton** (WSC 08NM241; Drainage area: 4.5 km²; Natural; Period of record: 1983-Present)
- **Dennis Creek near 1780 Metre Contour** (WSC 08NM242; Drainage area: 3.73 km²; Natural; Period of record: 1985-Present)

In addition, historic records are available for the following hydrometric stations within the watershed:

- **Greyback Lake at the Outlet** (WSC 08NM169; Regulated; Period of record: 1970-1987)
- **Penticton Creek Above Dennis Creek** (WSC 08NM168; Drainage area: 35.5 km²; Regulated; Period of record: 1970-1999)
- **Howard Creek near Penticton** (WSC 08NM068; Regulated; Period of record: 1930-1930)
- **Reed Creek near Penticton** (WSC 08NM069; Regulated; Period of record: 1930-1930)
- **Penticton Creek Below Harris Creek** (WSC 08NM170; Drainage area: 153 km²; Regulated; Period of record: 1970-1981)
- **Penticton Creek Lot 19 Diversion** (WSC 08NM063; Regulated; Period of record: 1926-1954)
- **Penticton Creek Above Diversion** (WSC 08NM076; Natural; Period of record: 1936-1941)
- **Penticton Creek main Diversion** (WSC 08NM032; Regulated; Period of record: 1919-1966)
- **Penticton Creek Below Diversion** (WSC 08NM031; Regulated; Period of record: 1919-1921)
- **Penticton Creek at the Mouth** (WSC 08NM118; Drainage area: 177 km²; Regulated; Period of record: 1950-1972)

In addition, the City of Penticton operated two hydrometric stations within the watershed during 2007:

- **Penticton Creek at Van Horne** (Period of record: 2007-2007)
- **Ellis Creek near the Mouth** (Period of record: 2007-2007)

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

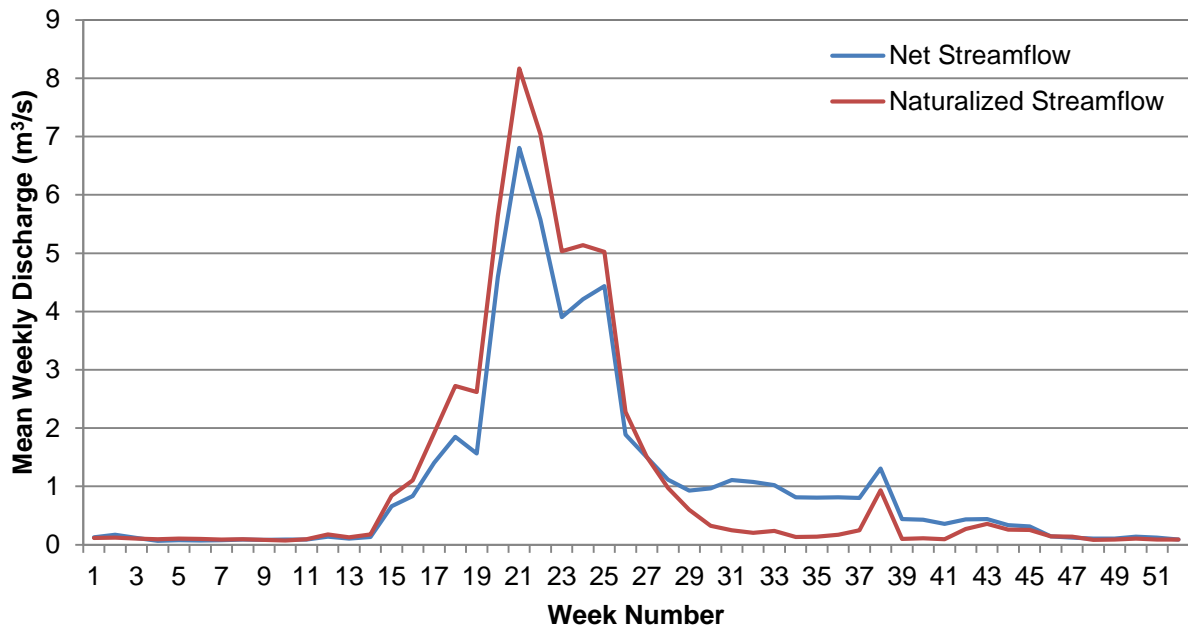


Figure 2-1
Mean weekly net and naturalized flows for Pentiction Creek at the mouth, 1996-2006 (Summit 2010)

2.3 FISH AND AQUATIC HABITAT

There is limited information available on fish and aquatic habitat within Pentiction Creek. Dobson (1998) completed a watershed assessment of the Pentiction Creek watershed and provided an overview of channel characteristics for select reaches of Pentiction Creek and its tributaries.

No sensitive habitat inventory and mapping (SHIM) has been completed for Pentiction Creek (Table 6-1 in the accompanying main report). However, the City of Pentiction is currently completing channel restoration along select sections of the creek (through the city) to improve flood protection and aquatic habitat.²

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.³

² More information on the Pentiction Creek restoration project can be found at: <http://www.pentiction.ca/EN/main/community/vibrant-pentiction/our-downtown/pentiction-creek.html>.

³ 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

Fish species found in Penticton Creek include rainbow trout, kokanee salmon, eastern brook 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.⁴

2.3.2 Fish Periodicity and Habitat Suitability

No stream-specific fish periodicity or habitat suitability indices have been determined for Penticton 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 Penticton Creek.

2.4 WATER USE AND STORAGE

The City of Penticton (CoP) is the main water supplier within the Penticton Creek watershed (Dobson 2008).

Summit (2010) provides an estimate of actual surface water use within the Penticton 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 2,893 ML. These water use estimates were subsequently included in the Okanagan Hydrologic Connectivity Model that was used to investigate ‘first-in-time, first-in-right’ water licence legislation within the Okanagan Basin (Summit 2013).

2.4.1 Storage Reservoirs

CoP hold water licences from the province to store approximately 12,330 ML of water in Grayback Reservoir (DHI 2010).

2.4.2 Water Licences and Major Points of Diversion

The CoP has an intake on Penticton Creek approximately 3 km upstream from the mouth (Dobson 2008). In addition, the CoP also extracts water from Okanagan Lake (Dobson 2008).

At present, there are 29 current water extraction licences within the Penticton 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.⁵

⁴ 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/>.

2.4.3 Interbasin Transfers

There are no direct diversions of water into or out of the Penticton Creek watershed; however, stored and extracted water is distributed for domestic and irrigation purposes by the CoP between the Penticton Creek and Ellis Creek watersheds, as well as neighbouring land parcels (i.e., Residual areas E-9, E-10, and E-11) (Dobson 2008).⁶

2.5 GROUNDWATER AND SURFACE WATER INTERACTION

Summit (2009) identified that Penticton 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.

⁵ 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.

⁶ 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).

References

- DHI Water and Environment (Canada) (DHI). 2010. Okanagan Basin Water Accounting Model. Prepared for the Okanagan Basin Water Board. May 2010.
- Dobson Engineering Ltd (Dobson). 2008. Water Management and Use Study. Prepared for Okanagan Basin Water Board as part of the Phase 2 Okanagan Water Supply and Demand Project.
- Dobson Engineering Ltd. (Dobson). 1998. Watershed Assessment Report for the Penticton Creek Watershed. Prepared for Weyerhaeuser Canada Limited. October 1998.
- ESSA Technologies Ltd. and Solander Ecological Research (ESSA and Solander). 2009. Instream Flow Analysis for the Okanagan Water Supply & Demand Project. Prepared for the Okanagan Basin Water Board.
- Koshinsky, G. D. 1972. Estimates of Minimum Flow Requirements for Okanagan Tributary Streams for the Propagation of Salmonid Fish Species Endemic to the Main Lakes. March, 1972.
- Northwest Hydraulic Consultants (nhc). 2001. Hydrology, Water Use and Conservation Flows for Kokanee Salmon and Rainbow Trout in the Okanagan Lake Basin, B.C. Prepared for B.C. Fisheries Management Branch, Victoria, B.C.
- Summit Environmental Consultants Inc. (Summit). 2009. Surface Water Hydrology and Hydrologic Modelling Study “State of the Basin” Report. Prepared for the Okanagan Basin Water Board as part of the Phase 2 Okanagan Water Supply and Demand Project.
- Summit Environmental Consultants Inc. (Summit). 2010. Okanagan Water Supply and Demand Project: Phase 2 Summary Report. Prepared for the Okanagan Basin Water Board, July 2010.
- Summit Environmental Consultants Inc. (Summit). 2013. Okanagan Hydrologic Connectivity Model: Summary Report. Prepared for the Okanagan Basin Water Board.

Table O-1 Summary of relevant information for setting environmental flow needs within Penticton Creek watershed

Information Source	Fish and Aquatic Habitat										Streamflow			Water Management																			
	Current Fish Species Presence	Historic Fish Species Presence	Fish Periodicity Tables	Aquatic Habitat	Channel Characteristics	Channel Cross-Sections	Channel Velocity/Depth Measurements	Habitat Suitability Index	Fish Barriers (Natural/Man-made)	EFN Investigations / Recommended Fish Flows	Other Relevant Information	Streamflow Measurements	Water Quality / Temperature	Streamflow Estimates	Other Relevant Information	History of Water Management	Water License Points-of-Diversion Mapping	Water License Information	Water License – Conservation Storage/Flows	Water Purveyor Intakes	Groundwater Wells Mapping	Groundwater Information	Water Use Information (Actual/Estimated)	Return Flow Information	Land Use and Associated Water Supply Source	Interbasin/Intrabasin Transfers	Flow Regulation	Reservoir Flow Release Patterns	Reservoir Minimum Flow Releases	Other Relevant Information			
Online Resources																																	
B.C. Habitat Wizard (http://www.env.gov.bc.ca/habwiz/)	✓							✓																									
B.C. Ministry of Forests, Lands, and Natural Resource Operations – Dam Safety Program (http://www.env.gov.bc.ca/wsd/public_safety/dam_safety/). Contact: Mike Noseworthy, Dam Safety Officer (Penticton).																																✓	
B.C. Water Licences Query (http://a100.gov.bc.ca/pub/wtrwhse/water_licences.input)																	✓																
B.C. Water Resources Atlas (http://www.env.gov.bc.ca/wsd/data_searches/wrbc/)											✓	✓				✓			✓	✓	✓										✓		
B.C. Water Use Reporting Center (http://www.obwb.ca/tools/bc-water-use-reporting-centre/)											✓												✓										
B.C. Water Well Application (https://a100.gov.bc.ca/pub/wells/public/)																						✓											
City of Penticton (http://www.penticton.ca/). Contact: Public Works Director															✓				✓			✓					✓	✓	✓	✓			
DataBC (http://www.data.gov.bc.ca/)											✓	✓				✓	✓		✓	✓	✓						✓						
Fisheries Inventory Summary System (http://www.env.gov.bc.ca/fish/fiss/)	✓			✓																													
Okanagan Historical Society Reports (https://open.library.ubc.ca/#/collections/ohs)															✓																		
Water Survey of Canada (https://www.ec.gc.ca/rhc-wsc/)											✓																						
Literature Resources																																	
Grainger and Associates Consulting Ltd. and Streamworks Unlimited. 2010. Penticton Creek Hydrological Risk Assessment. Prepared for BC Ministry of Environment. November 2010.	✓				✓					✓		✓																					
Western Water Associates Ltd., Polar Geoscience Ltd., and ESSA Technologies Ltd. 2014. Okanagan Water Allocation Tool Plan. Prepared for the Okanagan Basin Water Board, May 2014.									✓	✓																							
Summit Environmental Consultants Inc. 2013. Okanagan Hydrologic Connectivity Model: Summary Report. Prepared for the Okanagan Basin Water Board, May 2013.									✓			✓	✓									✓					✓						

