Appendix M - Naramata Creek

Associated Environmental

APPENDIX M

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

Naramata Creek

May 2016

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APPENDIX M

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APPENDIX M

1 Introduction

The purpose of this appendix is to provide information to support the application of recommended environmental flow needs (EFN)-setting methods for Naramata Creek following the methods outlined in the accompanying report[1]. 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 Naramata Creek is provided in Table 6-1 in the accompanying report and Table M-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 Naramata Creek by 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 Naramata Creek. Available information sources for Naramata Creek are included in Table M-1 at the end of this appendix.

2.1 OVERVIEW OF THE WATERSHED

Naramata Creek has a watershed area of 41.8 km^2. Located on the east side of Okanagan Lake approximately 11 km north of the City of Penticton, Naramata Creek flows for 12.7 km (headwaters to mouth) before discharging into Okanagan Lake at the community of Naramata. Land use within the watershed is forestry in the headwaters and predominantly agricultural and urban development within the lower reaches.

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

2.2 STREAMFLOWS

2.2.1 Hydrometric Data

There are no active or discontinued Water Survey of Canada (WSC) hydrometric stations within the Naramata 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

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 Naramata 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 Naramata Creek (Summit 2010). Figure 2-1 provides a summary of the modelled mean weekly net and naturalized streamflows for Naramata Creek at the mouth for 1996-2006 (i.e., the model calibration period).

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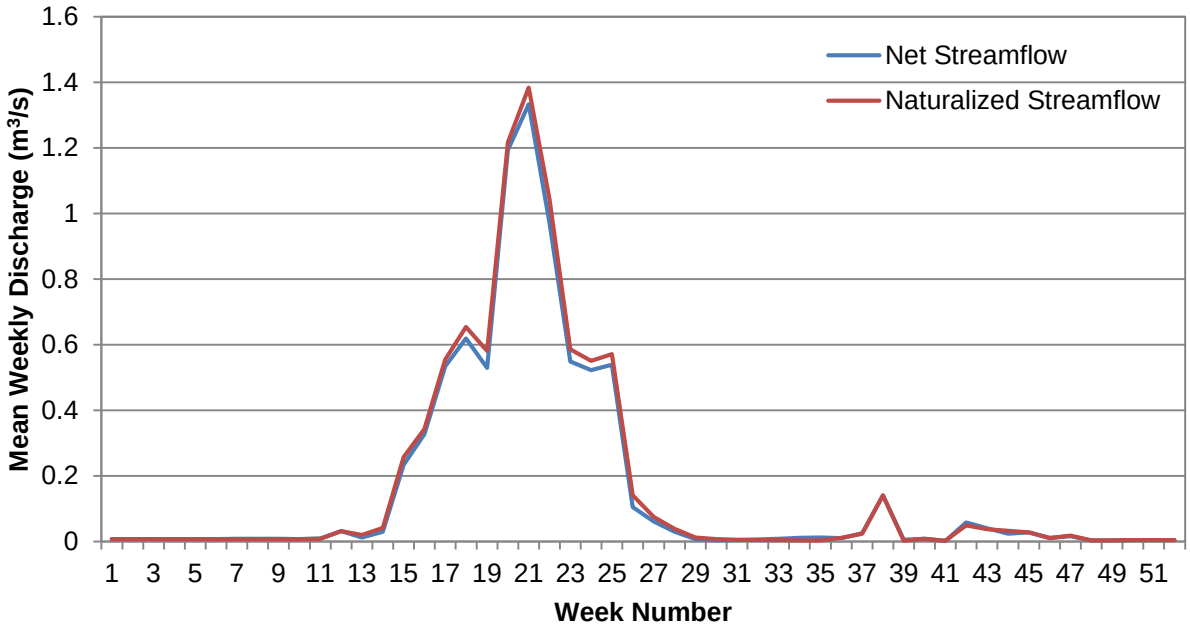

Figure 2-1
Mean weekly net and naturalized flows for Naramata Creek at the mouth, 1996-2006 (Summit 2010)

2.3 FISH AND AQUATIC HABITAT

There is little information available on aquatic habitat within Naramata Creek. However, a 3.5 m high dam approximately 3.4 km upstream from the mouth and a 5 m high waterfall further upstream have been documented as fish barriers (Anonymous, undated).

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2.4 WATER USE AND STORAGE

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Summit (2010) provides an estimate of actual surface water use within the Naramata 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 696 ML. This water use estimate represents pre-Okanagan Lake water supply for the community of Naramata.

[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/.
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There are no storage reservoirs within the Naramata Creek watershed; however, as part of the Chute-Robinson-Naramata Creek diversion system (Section 2.4.3), three reservoirs within Chute and Robinson Creek watersheds have historically been used to support water supply requirements for the community of Naramata through a series of diversion ditches. The reservoirs include Big Meadow Reservoir (Chute Creek watershed) and Elinor and Naramata Lakes (Robinson Creek watershed).

2.4.2 Water Licences and Major Points of Diversion

There are 13 current water extraction licences within the Naramata 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]

Although no longer operational, the RDOS' South Intake is located on Naramata Creek approximately 3 km upstream from the mouth, as well; the high line diversion (Section 2.4.3) adds water to Naramata Creek approximately 100 m upstream of the South Intake.

2.4.3 Interbasin Transfers

Water from Chute and Robinson Creeks is transferred into the Naramata Creek watershed by the Chute-Robinson-Naramata Creek diversion system. RDOS (1982) summarizes the diversion system as follows:

- Water is diverted from Chute Creek watershed via a diversion ditch into Elinor Lake (located within the Robinson Creek watershed);
- Water flowing within Robinson Creek is either diverted into the high line diversion (into Naramata Creek watershed) or extracted by the North Intake (located near the mouth of Robinson Creek) by the RDOS; and
- The high line diversion adds water directly to Naramata Creek upstream of the RDOS's South Intake. The high line diversion is generally operational from July to September.

Estimates of diversion volumes are provided by Dobson (2008 [included in Summit 2010]) and Summit (2010).

2.5 GROUNDWATER AND SURFACE WATER INTERACTION

Summit (2009) identified that Naramata Creek likely loses water to groundwater and estimated that streamflow is lost to groundwater at a rate of 0.014 m^3/s per km of channel across the alluvial fan (Section 3.6 of Summit 2009).

[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.

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.

References

Anonymous. Undated. Okanagan Watershed Descriptions for Chute Creek, Eneas Creek, Equesis Creek, Kelowna (Mill) Creek, Lambly Creek, Mission Creek, Naramata Creek, Naswhito Creek, Okanagan lake, Peachland Creek, Penticton Creek, Powers Creek, Robinson Creek, Shingle Creek, Similkameen River, Trepanier Creek, Trout Creek, Vaseux Creek, Vernon Creek. Ecocat Report ID 32362.

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Wightman, J.C., and G.D. Taylor. 1978. Overview and rating of production capabilities and enhancement opportunities for rainbow trout and kokanee in tributaries to upper Okanagan basin lakes. Fish Habitat improvement Section, Fish and Wildlife Branch, Ministry of Recreation and Conservation, Victoria, B.C.

Table M-1 Summary of relevant information for setting environmental flow needs within Naramata Creek watershed

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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/)																					✓										
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)																✓															
Regional District of Okanagan-Similkameen (http://www.rdos.bc.ca/home/). Contact: Works Superintendent																✓				✓			✓				✓				✓
Water Survey of Canada (https://www.ec.gc.ca/rhc-wsc/)												✓																			
Literature Resources																															
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.														✓									✓				✓				
Epp, P. 2012. HSI tables in Microsoft Excel Files: Glide Habitat Template and Riffle Habitat Template.							✓																								

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Rayne, S., and K. Forest. 2010. Historical trends in annual water yields for the Okanagan Basin, British Columbia, Canada. Nature Proceedings: doi: 10.1038/npre.2010.4946.1															✓																
van der Gulik, T., Neilsen, D., and R. Fretwell. 2010. Agriculture Water Demand Model – Report for the Okanagan Basin. February 2010.																						✓		✓							
DHI Water and Environment. 2010. Okanagan Basin Water Accounting Model. Prepared for the Okanagan Basin Water Board, November 2010.														✓												✓					
Polar Geoscience Ltd. 2009. Okanagan Basin Water Supplier Sources. Excel spreadsheet identifying water use areas in the Okanagan and the associated source(s) and water supplier. Digital file: Water supplier sources ver 15.xls.																✓				✓		✓	✓		✓						✓
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Neilsen-Welch, L., and D. Allen. 2007. Groundwater and Hydrogeological Conditions in the Okanagan Basin, B.C. A State of the Basin Report. Prepared for the Okanagan Basin Water Board, December 2007.																					✓										
Ptolemy, R. 2005. HSI Charts and Tables in Microsoft Excel File: WUP-HSI.								✓																							
Chara Consulting. 2004. Kokanee Stream Spawner Enumeration of the Okanagan Valley's Main Lakes,	✓																														

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2004.																															
Matthews, S. 2003. Notes on Fish/Habitat Values and Potential Impacts Associated with Various Water Supply Scenarios in Naramata Creek. Naramata Environmental Roundtable – Sustainable Community Series Water Maters – December 2003.	✓				✓					✓	✓																				
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Summit Environmental Consultants Ltd. 1995. Naramata and Robinson Creeks Stream Assessment. Prepared for B.C. Ministry of Environment, Lands and Parks, December 1995.	✓							✓																							
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Obedkoff, W. 1987. Naramata Creek Peak Flow Estimates. Memorandum dated September 16, 1987. Ministry of Environment and Parks, Water Management Branch. File S2106, Study 263.														✓																	
Stanley Associates Engineering Ltd. Naramata Irrigation District Water Supply Study (with well-drilling logs), March 1983.														✓																	
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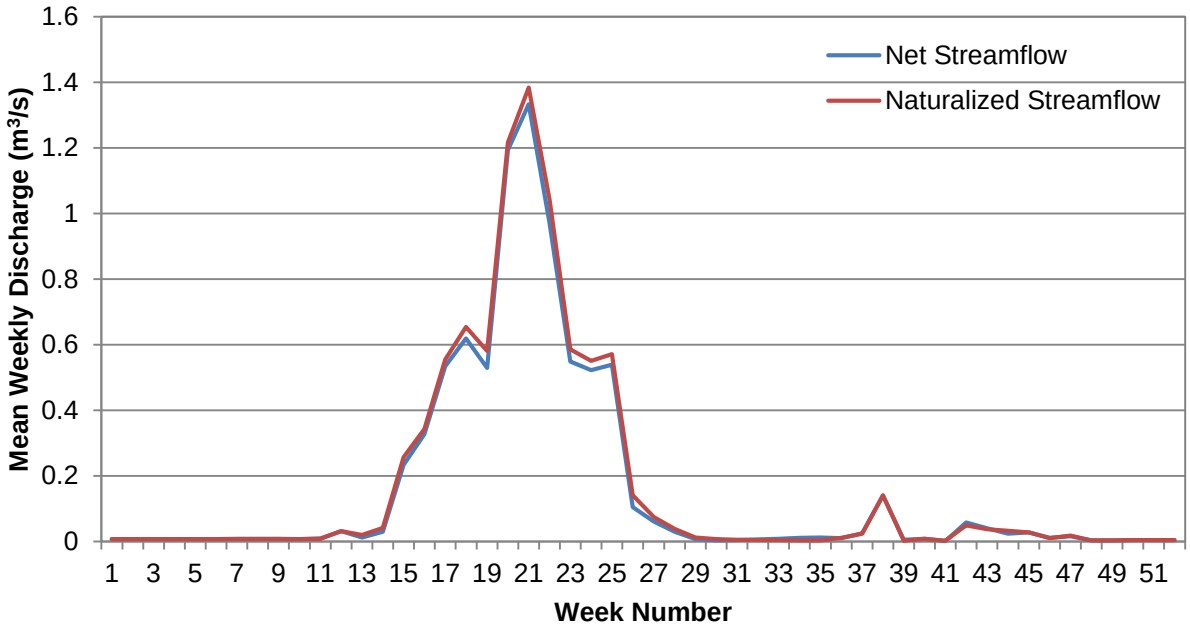

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Although no longer operational, the RDOS' South Intake is located on Naramata Creek approximately 3 km upstream from the mouth, as well; the high line diversion (Section 2.4.3) adds water to Naramata Creek approximately 100 m upstream of the South Intake.

2.4.3 Interbasin Transfers

Water from Chute and Robinson Creeks is transferred into the Naramata Creek watershed by the Chute-Robinson-Naramata Creek diversion system. RDOS (1982) summarizes the diversion system as follows:

- Water is diverted from Chute Creek watershed via a diversion ditch into Elinor Lake (located within the Robinson Creek watershed);
- Water flowing within Robinson Creek is either diverted into the high line diversion (into Naramata Creek watershed) or extracted by the North Intake (located near the mouth of Robinson Creek) by the RDOS; and
- The high line diversion adds water directly to Naramata Creek upstream of the RDOS's South Intake. The high line diversion is generally operational from July to September.

Estimates of diversion volumes are provided by Dobson (2008 [included in Summit 2010]) and Summit (2010).

2.5 GROUNDWATER AND SURFACE WATER INTERACTION

Summit (2009) identified that Naramata Creek likely loses water to groundwater and estimated that streamflow is lost to groundwater at a rate of 0.014 m^3/s per km of channel across the alluvial fan (Section 3.6 of Summit 2009).

[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.

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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Table M-1 Summary of relevant information for setting environmental flow needs within Naramata 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/)																					✓										
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)																✓															
Regional District of Okanagan-Similkameen (http://www.rdos.bc.ca/home/). Contact: Works Superintendent																✓				✓			✓				✓				✓
Water Survey of Canada (https://www.ec.gc.ca/rhc-wsc/)												✓																			
Literature Resources																															
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.										✓																					
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Epp, P. 2012. HSI tables in Microsoft Excel Files: Glide Habitat Template and Riffle Habitat Template.							✓																								

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Rayne, S., and K. Forest. 2010. Historical trends in annual water yields for the Okanagan Basin, British Columbia, Canada. Nature Proceedings: doi: 10.1038/npre.2010.4946.1															✓																
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2004.																															
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