3.11 Shorts Creek

Shorts Creek flows from the west side of the Okanagan Basin into Okanagan Lake north of Westbank, B.C. The watershed has an area of approximately 186 km^2 with Dunwaters Creek as the main tributary (Associated 2016). The creek flows over a series of waterfalls through a steep-sided canyon near the mouth. Below the canyon, Shorts Creek flows over a large alluvial fan before its confluence with Okanagan Lake. Forest harvesting is the primary land use in the upper reaches and some agricultural use occurs in the lower reaches. The land near the mouth is a residential area as well as Fintry Provincial Park. A summary of creek characteristics is found in Table 3-33 and additional stream-specific data is provided in Appendix B11.

The lower section of Shorts Creek shows signs of prior channelization but a relatively large amount of productive fish habitat remains (Koshinsky 1972b; Wildstone Resources Ltd. 1997). Shorts Creek is known to support populations of Kokanee (spawning) and Rainbow (Associated 2016). The lowest barrier to fish migration is a series of falls that begin approximately 1.2 km from the mouth (Eyjolfson & Dunn 2016). However, Rainbow occur in reaches upstream of the falls (Wildstone Resources Ltd. 1997). Kokanee access to the lower reaches of Shorts Creek has been limited during some years by sediment buildup at the mouth resulting from longshore drift. During the 2017 freshet, a log jam washed out upstream of the falls resulting in a large deposit of bedload and the channel near the mouth was dry. Restoration works are currently underway by FLNRORD to restore fish access and reconstruct the channel (White pers. comm. 2019).

Shorts Creek is headed by several small lakes and wetlands. Historic reports indicate that the stream was not known to go dry (Anonymous 1969) but late summer and fall flows during dry years are sometimes too low to sustain Kokanee spawning (Wildstone Resources Ltd. 1997). It is estimated that water losses to groundwater occur on the alluvial fan near the mouth (Associated 2019). At present there are 33 points of diversion within the watershed, though the actual volume extracted annually is unknown (Associated 2019). There is no main water user listed in the watershed and there is no developed water storage (Associated 2016). There have been inter-basin water transfers out of the Shorts Creek watershed and a potential for further transfers (Associated 2016) and there are no restrictions or reserves on future water licensing noted for Shorts Creek (FLNRORD 2016). Naturalized flow data provided by Associated (2019) indicate that the lower reaches of Shorts Creek are 'flow sensitive' during summer and winter as naturalized flows are well below 20% LTMAD (Table 3-34). ONA maintains one hydrometric station upstream of the falls. Stream temperatures recorded at the station are generally favourable to rainbow rearing (<20°C; Figure B11-3, Appendix B11).

Table 3-33: Shorts Creek description

Drainage Area	186 km^2
Median Elevation	1350 m
ONA station	08NM151HDS Shorts Creek near the Mouth (2014-to present)
WSC station	08NM151 (historic) Shorts Creek at the Mouth (1969-1982)
LTMAD	1.007 m^3/s (Associated 2019)
Fish species expected	Rainbow, Kokanee, Eastern Brook Trout, Largescale Sucker, Longnose Dace, Prickly Sculpin, Sculpin (general) (ESSA & Solander, 2009)
Land use	Forestry in the upper watershed. Creek runs through Fintry Provincial Park in the lower watershed (Associated 2019)

Naturalized, residual and maximum licensed flow data were provided by Associated (2019) with an estimated data quality rating of B (data error between 10% and 25%). Estimated naturalized summer low flows for Shorts Creek were extremely low (3% LTMAD) and not sufficient to sustain fish habitat. Flows near the mouth fluctuate greatly from year to year and the reach is known to go dry during some years due to the coarse gravel deposits near the mouth. Estimated maximum licensed flows indicate that the creek would be nearly dry from mid-August to mid-September if licensed withdrawal volumes were maximized.

Okanagan Tennant EFNs for Shorts Creek were developed in accordance with the methods outlined in Section 2.2. No WUW data was collected in Shorts Creek. Fish periodicity and flow standards described in Table 2-2 to Table 2-6 were used. EFNs for Kokanee spawning and Rainbow rearing were set under consideration of flow standards, naturalized flow estimates, previously collected habitat data (Tredger 1989b) and WUW information from nearby Whiteman Creek which is similar in size. Some resulting EFN recommendations were greater than the naturalized flow estimates; however, it is acknowledged that flows may naturally be lower than the recommended EFN during some years. A summary of EFNs for Shorts Creek is provided in Table 3-35 including the median EFN and the range of weekly EFNs, with weekly details in Figure 3-24, Figure 3-25 and Appendix B11, and flow sensitives in Table 3-34. Further information on EFN setting in Shorts Creek is provided at the end of this section.

Table 3-34: Flow sensitivities in Shorts Creek

Species & life stage	**1-in-2 yr 30-day summer low flow**		**1-in-2 yr 30-day winter low flow**	
	Flow (m^3/s)	% LTMAD	Flow (m^3/s)	% LTMAD
Rainbow rearing	0.029	3%		
Insect production				
Kokanee spawning				
Rainbow overwintering			0.035	3%
Kokanee egg incubation				

Source: Associated (2019)

Table 3-35: EFN summary table for Shorts Creek

Species & life stage	**Time period**	**Okanagan Tennant Recommended EFN**				**Critical flow**	
		Median (m^3/s)	% LTMAD	Min (m^3/s)	Max (m^3/s)	Median (m^3/s)	% LTMAD
Rainbow rearing & insect production [a]	April 1 – Oct 31	0.100	10%	0.100	0.419	0.050	5%
Rainbow spawning	May 20 – Jul 10	1.49	148%	0.667	5.78	0.503	50%
Kokanee spawning	Sep 18 – Oct 26	0.140	14%	0.140	0.140	0.101	10%
Rainbow overwintering	Nov 1 – Mar 31	0.057	6%	0.046	0.082	0.050	5%

a while EFNs apply to the entire period, median values are presented for the summer low flow period from Jul 15- Sept 30.

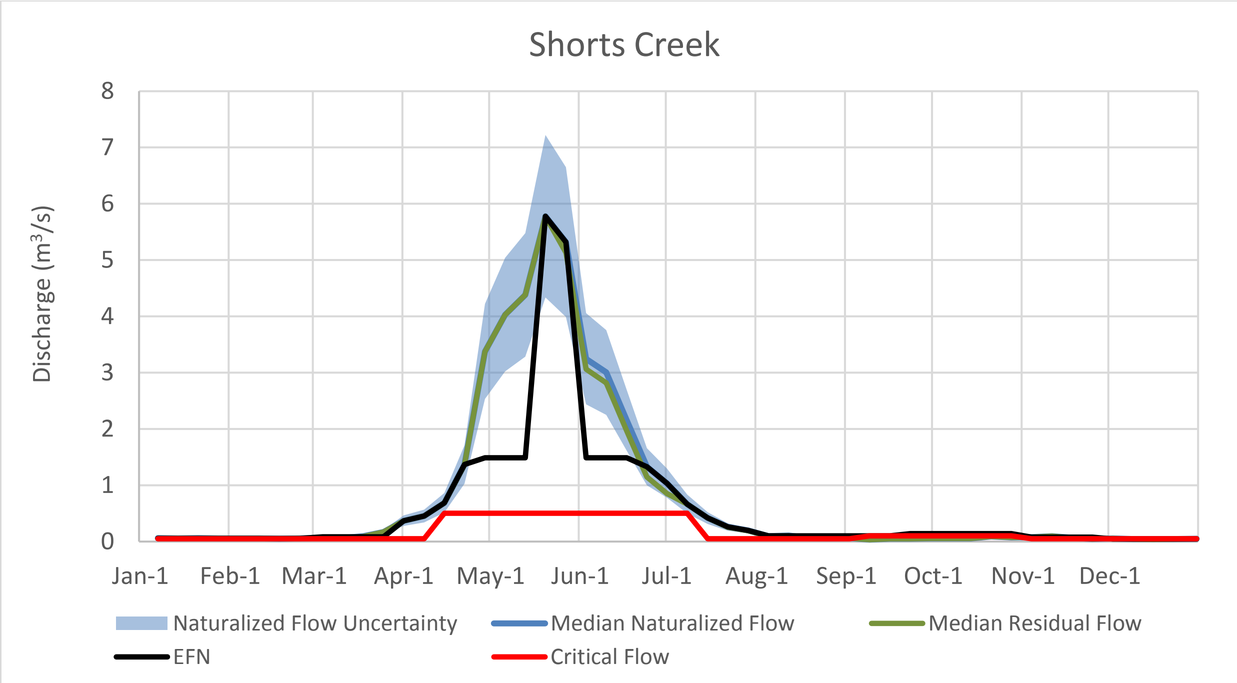

Figure 3-24: Weekly EFNs, critical flow and streamflows in Shorts Creek

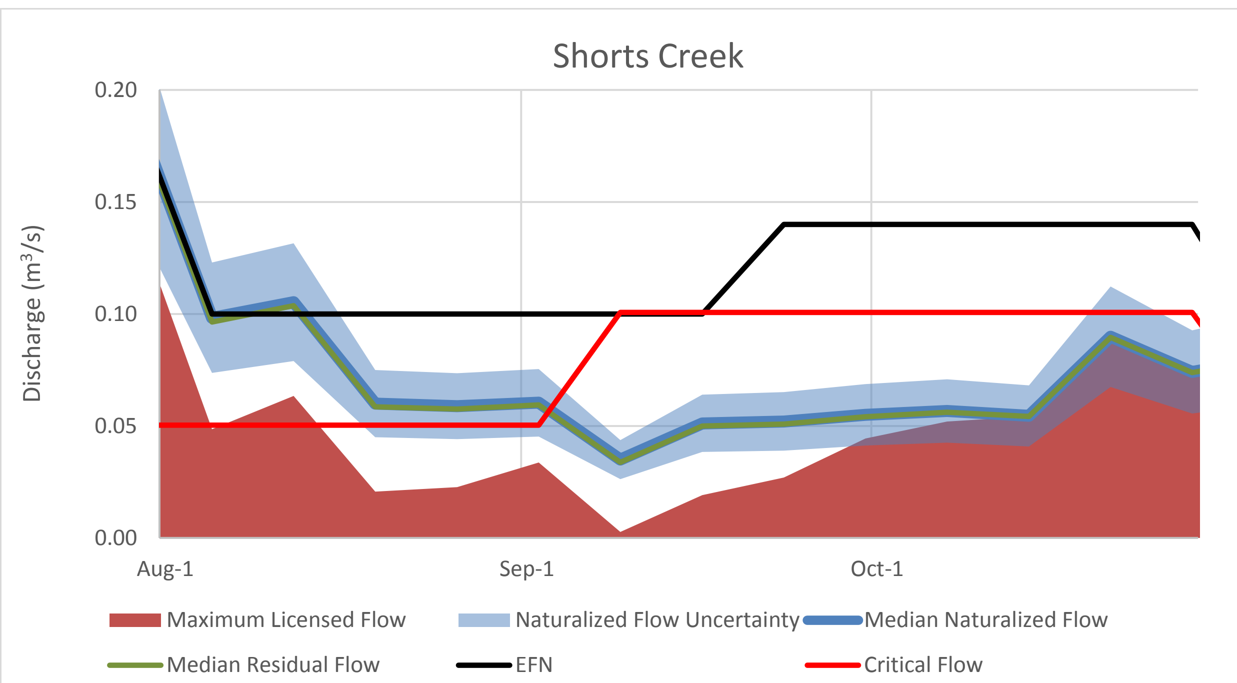

Figure 3-25: Weekly EFNs, critical flow and streamflows during the flow sensitive time in Shorts Creek

Rainbow parr rearing

Estimated weekly naturalized flows (Associated 2019) range from 0.035 to 0.419 m^3/s (median 0.06 m^3/s, 6% LTMAD) during the mid-July to late September period. However, the recommended EFN for Rainbow parr rearing is 0.100 m^3/s (10% LTMAD), which is greater than the weekly naturalized flow estimates from mid-August onward (Figure 3-25), for the following reasons:

1) WUW information collected by Tredger (1989b) in the lower reaches of Shorts Creek indicates large gains in Rainbow parr rearing capacity up to about 0.100 m^3/s (10% LTMAD);
2) The Rainbow parr rearing EFN recommendation for nearby Whiteman Creek is 0.158 m^3/s and for Naswhito Creek is 0.090 m^3/s based on WUW data;
3) The lowest weekly flows recorded at the ONA hydrometric station between 2014 and 2018 (records residual flows upstream of the falls) ranged from 0.062 m^3/s to 0.092 m^3/s (Figure B11-1, Appendix B11);
4) Previous EFN recommendations for Rainbow rearing ranged from 0.1 - 0.382 m^3/s (Dobson 1990), 0.17 - 0.23 m^3/s (Koshinsky & Wilcocks 1973) and 0.4 - 0.8 m^3/s (ESSA & Solander 2009); and
5) While flows might be naturally lower than the recommended EFN during some years, there is significant benefit to parr rearing capacity by maintaining flows greater than 0.100 m^3/s whenever possible.

Recent and historical residual flows are below the EFN during some years (Figures B11-1 and B11-2), indicating that there may be difficulty in achieving EFNs during some years. The recommended critical flow for Rainbow parr rearing is 0.050 m^3/s (5% LTMAD) based on the LTMAD criterion (Table 2-7).

Rainbow spawning

The recommended Okanagan Tennant EFN for Rainbow spawning is 1.49 m^3/s (148% LTMAD). One previous EFN recommendation was 2.2 m^3/s (ESSA & Solander 2009); however, based on WUW information from nearby Whiteman Creek, which is similar in size and channel characteristics, the recommended EFN of 1.49 m^3/s is thought to be sufficient. Naturalized and residual flows are greater than the EFN for most of the spawning period (Figure 3-24). The recommended critical flow for Rainbow spawning is 0.503 m^3/s (50% LTMAD) based on the LTMAD criterion (Table 2-7).

Kokanee spawning

Estimated naturalized flows (Associated 2019) during the Kokanee spawning period range from 0.052 – 0.090 m^3/s. However, the recommended EFN for Kokanee spawning is 0.140 m^3/s (14% LTMAD), which is greater than the naturalized flow estimates (Figure 3-25), for the following reasons:

1) WUW information collected by Tredger (1989b) in the lower reaches of Shorts Creek indicates relatively little habitat capacity at the estimated naturalized flows during the spawning period (median 0.056 m^3/s);
2) The EFN recommendation for nearby Whiteman Creek is 0.141 m^3/s and for Naswhito Creek is 0.090 m^3/s based on WUW data;
3) Previous EFN recommendations for Kokanee spawning were 0.23 - 0.28 m^3/s (Koshinsky 1972b) and 0.16 m^3/s (Dobson 1990);
4) Ptolemy (2019) notes that average year base flow is 0.11 m^3/s and Dobson (1990a) provides estimates of mean monthly flows (September = 0.197 m^3/s). Discharges of 0.11 m^3/s are equal to a historic

minimum flow obtained in late August 1977, which was a hot and dry year when several other streams were reported to be dry (Wightman & Taylor 1978);

5) WUW data by Tredger (1989b) indicates that Kokanee spawning capacity more than doubles between the estimated median naturalized flows and the recommended EFN of 0.14 m^3/s; and
6) While flows might naturally be lower than the recommended EFN during some years, Shorts Creek demonstrates significant potential Kokanee spawning capacity as long as sufficient flows are maintained (Tredger 1989b; Koshinsky 1972b).

Recent and historical residual flows are below the EFN during most years (Figures B11-1 and B11-2), indicating that there may be frequent difficulty in achieving EFNs. The recommended critical flow for Kokanee spawning is 0.101 m^3/s (10% LTMAD) based on the LTMAD criterion (Table 2-7).