

**Icicle Creek  
Instream Flow  
Sub Committee Winter  
WUA Reach 4  
Report to the Steering  
Committee**

**Of the Icicle Work Group**

**July 17, 2014**

## Reach 4 Flow Recommendation

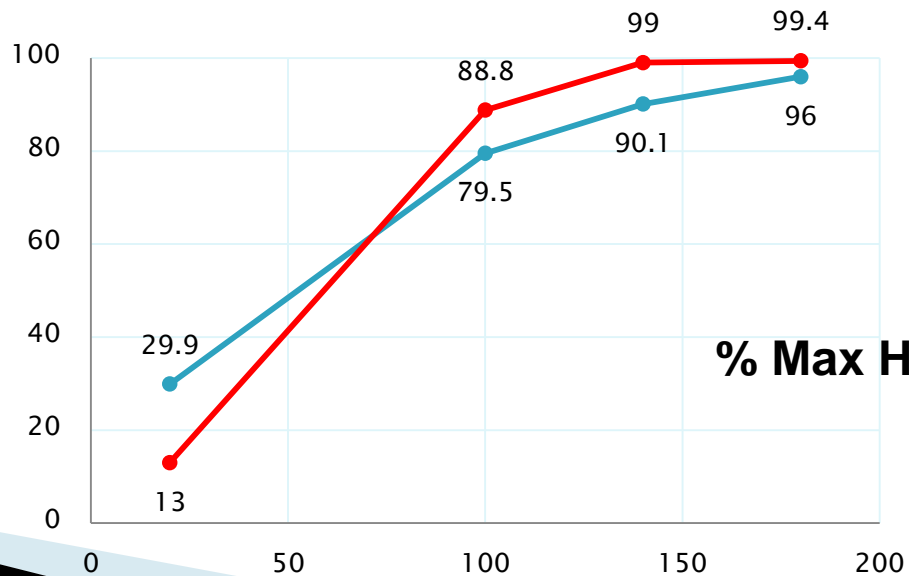
? - Maximum habitat

steelhead spawning flows are way below actual Q in historic channel.

Idea: Supplement hatchery channel flows during the spring with excess Q? Just don't go below 250 cfs.

Month	Gage Q	+ Snow Cr	(-) W/D	Focal Species & Life Stage WUA	Reach Q	Flow Rule (cfs)	Q Deficit	Recommended Flow
April	661	24	127	Steelhead Rearing 250 cfs	558		No	?
May	1,690	56	152		1,594		No	
June	1,890	30	155		1,765		No	
July	874	44	170	Fluvial Bull Trout Passage; 1.0-ft depth requirement 180 cfs	748		No	250 cfs
Aug	264	37	170		131	400	(-) 119 cfs	
Sept	161	43	141		63	275	(-) 187 cfs	
Oct	235	33	59		209	267	(-) 41 cfs	

% Max Habitat



Red = SH spawning  
Blue = SH rearing

% Max Habitat vs Flow

CFS

# Reach 5 Hydrology & Flow Recommendations Based on WUA

Month	Gage Qi	+ Snow Cr	(-) W/D	Hatchery Return	Focal Species & Life Stage WUA	Reach Qi	Flow Rule (cfs)	Qi Deficit	Recommended Flow
April	661	24	127	Est. 40	Steelhead & Rainbow Rearing 550 cfs	598		(-) 52 cfs	650
May	1,690	56	152	40		1,634		No	
June	1,890	30	155	40	Steelhead spawning (April) 650 cfs	1,805		No	
July	874	44	170	40		788		No	
Aug	264	37	170	40		171	400	(-) 379 cfs	400 cfs
Sept	161	43	141	40		103	275	(-) 447 cfs	275 cfs
Oct	235	33	59	40		249	267	(-) 301 cfs	267 cfs

Qi = USGS Snow Creek gage

Flow Rule applies at RM 1.5

Deficit measured at RM 1.5

# Winter Time Reach 4 Hydrology & Flow Recommendations Based on WUA Based on Monthly Mean

Month	Gage Qi	+ Snow Cr	(-) W/D	Focal Species & Life Stage WUA	Reach Qi	Flow Rule (cfs)	Qi Deficit	WUA Recommended Flow
Nov	402	4	42	Steelhead Rearing 250 cfs	364	267	No	250 cfs
Dec	341	9	42		308	267	No	250 cfs
Jan	303	9	42	Fluvial Bull Trout Passage; 1.0-ft depth requirement 180 cfs	270	267	No	250 cfs
Feb	293	32	42		283	267 566	No No	250 cfs
March	299	21	42		278	518	No	250 cfs

Flow Rule applies at RM 1.5

Qi = USGS gage

Deficit measured at RM 1.5

# Winter Time Reach 4 Hydrology & Flow Recommendations Based on WUA

## Lowest 5 year average

Month	Gage Qi	+ Snow Cr	(-) W/D	Focal Species & Life Stage WUA	Reach Qi	Flow Rule (cfs)	Qi Deficit	WUA Recommended Flow
Nov	90	2	42	Steelhead Rearing 250 cfs	50	267	(-) 200	250 cfs
Dec	99	5	42		62	267	(-) 188	250 cfs
Jan	108	5	42	Fluvial Bull Trout Passage; 1.0-ft depth requirement 180 cfs	71	267	(-) 179	250 cfs
Feb	93	16	42		67	267 566	(-) 183	250 cfs
March	144	11	42		113	518	(-) 137	250 cfs

Flow Rule applies at RM 1.5

Qi = USGS gage

Deficit measured at RM 1.5

# Winter Flow Recommendations (cfs) For Reach 4 Based – WUA Low Flow Assessment

Reach		4
<b>November – WUA recommendation</b>		250 – rearing WUA
Flow Deficit*		(-) 200
% of Maximum Habitat		55.0%
<b>December – WUA recommendation</b>		250
Flow Deficit*		(-) 188
% of Maximum Habitat		62.5%
<b>January – WUA recommendation</b>		250
Flow Deficit*		(-) 179
% of Maximum Habitat		67.3%
<b>February – WUA recommendation</b>		250
Flow Deficit*		(-) 183
% of Maximum Habitat		65.2%
<b>March – WUA recommendation</b>		250
Flow Deficit*		(-) 137
% of Maximum Habitat		81.2%

\*Flow deficit equals reach focal species WUA minus reach Qi

# Snow Creek Monthly Mean Flow

Month	Mean Flow (cfs)	Qa
Oct	33.5	2,060
Nov	3.9	232
Dec	9.0	553
Jan	9.0	553
Feb	32.3	1,794
Mar	21.6	1,328
Apr	23.7	1,410
May	56.0	3,443
June	29.6	1,761
July	43.5	2,675
Aug	36.6	2,250
Sept	43.3	2,577

-1994 to 2002  
- At confluence

*Upper Snow Lake capacity =  
12,450 AF of storage*

# Icicle Creek Instream Flow Rule 2008 And Historical Flows Upstream at RM 5.8

Flow rule control point = RM 1.5,  
within Reach 4

\*Snow Creek USGS gage  
#12458000 (1936 to 2014)

Month/Day	Rule cfs, RM 1.5	Monthly Mean at RM 5.8*
January 1	267	303
Feb 1	267	293
Feb 15	566	
March 1	518	299
April 1	650	661
May 1	650	1,690
June 1	650	1,890
June 15	550	
July 1	550	874
Aug 1	400	264
Aug 15	343	
Sept 1	275	161
Oct 1	267	235
Nov 1	267	402
Dec 1	267	341



# Water Rights

Water Right	Source	Date	Qi (cfs) or Qa	POD (RM)
Icicle ID	Icicle Creek	1910	83.3	5.7
	Eightmile Lake	1926	2,500 AF 25 CFS	9.1
	Colchuck Lake	1926	2,500 AF 50 CFS	9.1
	Square Lake	1930's	2,500 AF, 10 cfs	27.93
	Kionaqua Lake	1926	2,500 AF, 25 cfs	21.75
	Snow Lake	1926	750 AF, 25 CFS	
Peshastin ID	Icicle Creek	1926	34.4	5.7
Cascade Orchard IC		1905	12.0	4.5
LNFH	Icicle Creek	1942	42	4.5
	Snow Lakes	1942	16,000 AF	Upper Snow LK
	Wells	1939 – 1980	14.9	Upland near RM 2.8 to 3.8
City of Leavenworth	Icicle Creek	1912	Surface = 275 AF GW = 926 AF	5.5
Icicle Creek Reservation	Icicle Creek	2008	0.1 cfs; additional 0.4 cfs – depends on projects benefits	Var.
Others	Icicle Creek & groundwater	Var.	Surface = 986 AF GW = 106 AF	Var.

# Questions?

Icicle Creek Work Group  
Instream Flow Subcommittee

Contact:

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- ▶ Paul LaRiviere – WDFW
- ▶ Dan Haller – Aspect Consulting