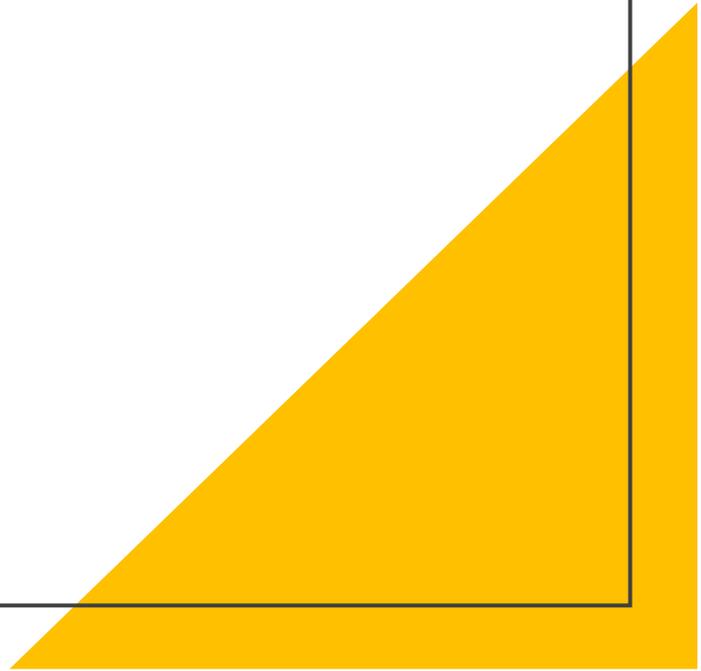


Columbia and Snake Rivers Temperature TMDL

Highlights and Overview Summary

February 2026



Beneficial Uses Protection



**Columbia and Lower Snake Rivers Temperature
Total Maximum Daily Load**

U.S. Environmental Protection Agency
Region 10
1200 Sixth Avenue, Suite 155
Seattle, WA 98101-3188



August 13, 2021

Document was revised on May 10, 2022 to correct minor formatting errors and inadvertent omission of a water quality limited segment from Table 1-1 (see letter from Daniel Opalski to Vincent McGowan on October 7, 2021).



EPA-910-R-21-001
January 2021



**Columbia River Cold
Water Refuges Plan**

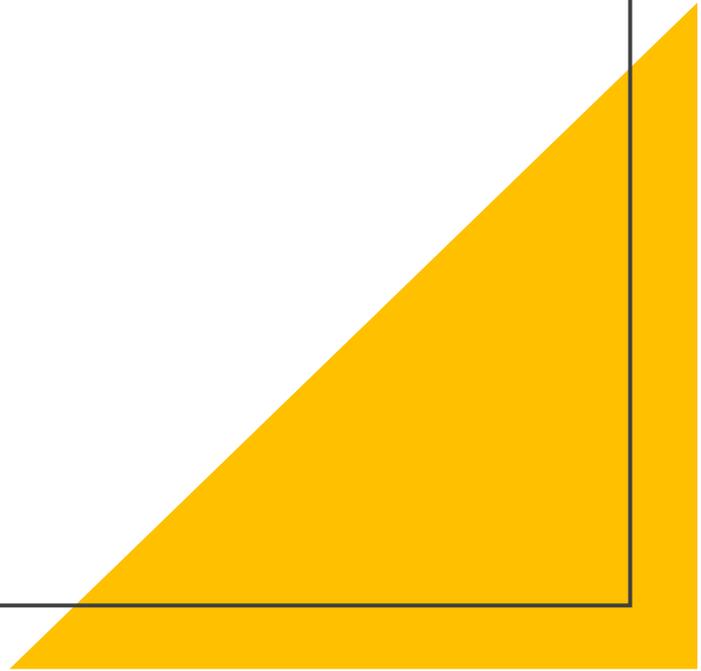
Prepared by:
U.S. Environmental Protection Agency
Region 10



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Topics

1. Overview of the TMDL
 - a. Loading Capacity
 - b. Allocations for point and non-point sources
 - c. Cold Water Refuge
2. Post-TMDL activities by source category
 - a) Dams
 - b) Point sources
 - c) Tributaries
 - d) Cold Water Refuges





0.3°C Load Capacity

Loading Capacity for human-caused sources is 0.3°C impact

- 0.1°C to 98 NPDES permitted point sources
- 0.1°C to 23 tributaries
- 0.1°C to 15 dam impoundments – nonpoint source impacts

Dam Impoundments

- Multi-step evaluation process
- Addresses:
 - seasonal differences – separate analyses by month
 - whether cumulative dam impact is less or greater than exceedance
 - whether specific dams are contributing to warmer temperatures or not
 - Allowing for a cumulative 0.1 °C impact at all target sites

Table 6-8 Cumulative excess dam impact on Columbia and lower Snake Rivers temperatures – August

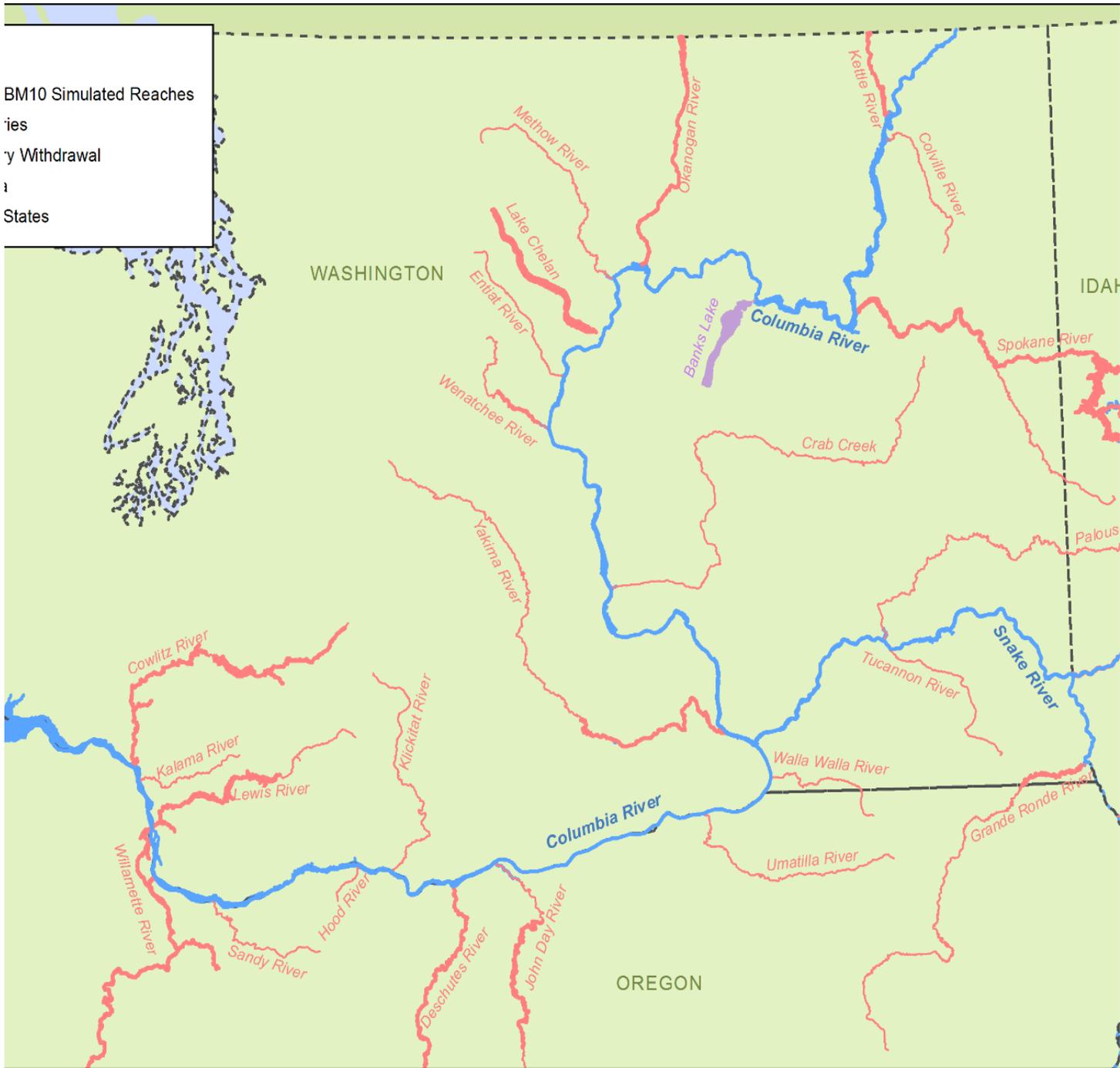
Location	Dam Number	RBM10 Current (°C)	RBM10 Free Flowing (°C)	RBM10 Reach Impact (Δ°C)	RBM10 Cumulative Impact (Δ°C)	Measured Target Exceedance (Δ°C)	Allocation Exceedance (Δ°C)	Notes
A	B	C	D	E	F	G	H	I
Columbia River								
Canadian Border	NA	17.77	17.78	NA	NA	4.2	NA	1
Lake Roosevelt	NA	18.31	18.13	0.2	0.2	4.0	0.1	2
Grand Coulee	1	18.11	18.29	-0.4	-0.2	3.6	None	6
Chief Joseph	2	18.20	18.39	0.0	-0.2	2.2	None	6
Wells	3	18.45	18.66	0.0	-0.2	2.4	None	6
Rocky Reach	4	18.87	18.83	0.2	0.0	2.8	None	6
Rock Island	5	18.98	18.86	0.1	0.1	2.7	None	4
Wanapum	6	19.40	19.05	0.2	0.3	2.9	0.2	2
Priest Rapids	7	19.62	19.15	0.1	0.5	3.2	0.4	2
Hanford Reach	NA	20.02	19.64	-0.1	0.4	1.6	0.3	2
Snake Confluence	NA	20.36	19.69	0.3	0.7	NA	NA	7
McNary	8	20.86	19.87	0.3	1.0	1.9	0.9	2
John Day	9	21.54	20.29	0.3	1.3	2.5	1.2	2
Dalles	10	21.50	20.32	-0.1	1.2	2.6	1.1	2
Bonneville	11	21.57	20.51	-0.1	1.1	2.7	1.0	2
Snake River								
Anatone	NA	22.50	22.50	NA	NA	3.9	NA	1
Clearwater Confluence	NA	18.32	18.28	NA	NA	NA	NA	1
Lower Granite	12	19.47	18.64	0.8	0.8	0.2	0.2	3
Little Goose	13	20.24	19.05	0.4	1.2	0.9	0.9	3
Lower Monumental	14	20.62	19.27	0.2	1.3	1.1	1.1	3
Ice Harbor	15	21.42	19.68	0.4	1.7	2.1	1.6	2

NPDES Point Sources (non-stormwater)

- Waste Load Allocations for major & minor facilities (kcal/day) allow for continued discharge at current levels
 - Maximum discharges evaluated – max temperature and design flow
- Reserve in each reach
 - Approximately equal to heat load of largest individual point sources
- 90th percentile impact of current maximum discharges plus reserve is 0.1 °C at river mile 42 (critical location).

Example: WLAs for NPDES permitted facilities on the Columbia River

Facility Name	Permit Number	Location (RM)	Flow (MGD)	Temp (° C)	WLA (kcal/day)
Wenatchee	WA0023949	466.6	5.5	26.2	5.44E+08
E Wenatchee Sewage Treatment Plant (STP)	WA0020621	465.7	3.0	26.2	2.97E+08
Alcoa Wenatchee	WA0000680	455.2	5.5	25.6	5.31E+08
Columbia Generating Sta / Energy Northwest	WA0025151	351.8	9.4	35.9	1.27E+09
Richland STP	WA0020419	337.1	11.4	29.4	1.27E+09
Kennewick Wastewater Treatment Plant	WA0044784	328.0	12.2	27.0	1.24E+09
Pasco	WA0044962	327.6	10.8	27.3	1.11E+09
Agrium Hedges	WA0003699	323.3	0.03	17.2	1.95E+06
Agrium Kennewick	WA0003671	322.6	22.6	23.1	1.97E+09
Agrium Finley	WA0003727	321.5	14.0	27.2	1.44E+09
Packaging Corporation of America	WA0003697	316.0	28.2	37.1	3.95E+09
The Dalles STP	OR0020885	186.5	4.2	27.0	4.23E+08
Hydro Extrusion USA, LLC	OR0001708	186.0	6.0	34.0	7.70E+08
Hood River OR STP	OR0020788	165.0	2.0	25.7	1.94E+08
Georgia Pacific / GP Consumer Operations LLC	WA0000256	120.0	76.0	37.7	1.08E+10
Gresham OR Waste Water Treatment Plant (WWTP)	OR0026131	117.5	15.0	23.9	1.35E+09



Tributaries

Allocation of 0.1° C cumulative increase

Equates to 0.5°C impact on temperature in each tributary.

Cold Water Refuges

The *Columbia River Cold Water Refuges Plan* is a scientific document with recommendations to protect and restore cold water refuges.

- By issuing this plan, EPA is meeting its responsibilities under the Endangered Species Act associated with its approval of Oregon's temperature standards for the Columbia River. This plan also serves as a reference for EPA's Columbia and Snake Rivers Temperature Total Maximum Daily Load (TMDL).

The plan:

- Describes available cold water refuges (CWR) in the Lower Columbia River.
- Characterizes how salmon and steelhead use CWR.
- Assesses the amount of CWR needed to attain Oregon's Clean Water Act: CWR narrative water quality standard.
- Identifies actions to protect and restore CWR.
- Recommends future CWR studies.

Tributary Name	River Mile	August Mean Mainstem Temperature (DART)	August Mean Tributary Temperature (NorWest)	August Mean Temperature Difference	August Mean Tributary Flow (NHD & USGS ¹)	Plume CWR Volume (> 2°C Δ)	Stream CWR Volume (> 2°C Δ)	Total CWR Volume (> 2°C Δ)
		°C	°C	°C	cfs	m ³	m ³	m ³
Skamokawa Creek (WA)	30.9	21.3	16.2	-5.1	23	450	1,033	1,483
Mill Creek (WA)	51.3	21.3	14.5	-6.8	10	110	446	556
Abernethy Creek (WA)	51.7	21.3	15.7	-5.6	10	81	806	887
Germany Creek (WA)	53.6	21.3	15.4	-5.9	8	72	446	518
Cowlitz River (WA)	65.2	21.3	16.0	-5.4	3634	870,000	684,230	1,554,230
Kalama River ² (WA)	70.5	21.3	16.3	-5.0	314*	14,000	27,820	41,820
Lewis River (WA)	84.4	21.3	16.6	-4.8	1291*	120,000	493,455	613,455
Sandy River (OR)	117.1	21.3	18.8	-2.5	469	9,900	22,015	31,915
Washougal River ¹ (WA)	117.6	21.3	19.2	-2.1	107*	740	32,563	33,303
Bridal Veil Creek (OR)	128.9	21.3	11.7	-9.6	7	120	0	120
Wahkeena Creek (OR)	131.7	21.3	13.6	-7.7	15	220	0	220
Oneonta Creek (OR)	134.3	21.3	13.1	-8.2	29	820	54	874
Tanner Creek (OR)	140.9	21.3	11.7	-9.6	38	1,300	413	1,713
Eagle Creek (OR)	142.7	21.2	15.1	-6.1	72	2,100	888	2,988
Rock Creek ¹ (WA)	146.6	21.2	17.4	-3.8	47	530	1,178	1,708
Herman Creek (OR)	147.5	21.2	12.0	-9.2	45	168,000	1,698	169,698
Wind River (WA)	151.1	21.2	14.5	-6.7	293	60,800	44,420	105,220
Little White Salmon River (WA)	158.7	21.2	13.3	-7.9	248*	1,097,000	11,661	1,108,661
White Salmon River (WA)	164.9	21.2	15.7	-5.5	715*	72,000	81,529	153,529
Hood River (OR)	165.7	21.4	15.5	-5.9	374	28,000	0	28,000
Klickitat River (WA)	176.8	21.4	16.4	-5.0	851*	73,000	149,029	222,029
Deschutes River (OR)	200.8	21.4	19.2	-2.2	4772*	300,000	580,124	880,124
Umatilla River ¹ (OR)	284.7	20.9	20.8	-0.1	87*	0	10,473	10,473

¹ Only provides intermittent cold water refugia; CWR volume represents volume when river is greater than 2°C colder than Columbia River.

² Tidally influenced and may be inaccessible during low tides.

Post TMDL Activities



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Total Maximum Daily Load**

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Water Refuges Plan**

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Dams

Water Quality Attainment Plans:

- Grand Coulee/Lake Roosevelt and Chief Joseph (2),
- Mid-Columbia PUDs (5),
- Lower Columbia (4), and
- Lower Snake River (4).

Point Sources

- Both states will place limits in reissued permits as they come due.
- Appendix J: NPDES Implementation Considerations
- Joint EPA/Ecology/DEQ memo on accessing and tracking reserve capacity (Dec 2022)
- State determinations are forthcoming, a structure is developed:
 - Oregon has accessed reserve for one facility to date since May 2020
 - Ecology currently evaluating possible access for a facility

Tributaries

- Oregon DEQ is checking all temperature TMDLs for tributaries to the Columbia/Snake against the load allocation.
 - Includes Sandy and Willamette river TMDLs.
 - So far, TMDL allocations to meet OR standards within the tributaries have been sufficient to meet Columbia River load allocations.
 - Scope and focus for Washington State – TBD
 - Other activities: Cold water refuge work and EPA's risk, process-based geomorphic model.
- 
- A large yellow triangle is positioned in the bottom right corner of the slide, pointing towards the top right.

Cold Water Refuge targets

- Temperature Targets for twelve primary cold water refuge tributary sites.
 - CWR effectiveness depends on water temperature, size (volume and flow), and accessibility of the area to migrating salmon and steelhead.
 - Facilitate and encourage cooperative efforts
- 
- A large yellow triangle is positioned in the bottom right corner of the slide, pointing towards the top right.

Tributaries Providing Cold Water Refuge in the Lower Columbia River

-  Dam Location
-  Primary CWR tributary temperatures > 4°C cooler than the Columbia
-  Primary CWR tributary temperatures between 2°C and 4°C cooler than the Columbia
-  Non-primary CWR tributary locations

