

# Updated Root River Return Flow Hydraulic Conditions for Maximum 10.1 mgd Return Flow Rate

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As part of the Wisconsin Department of Natural Resources (WDNR) review of The City of Waukesha Application for Lake Michigan Diversion with Return Flow (Application), the WDNR requested that Tables 3 and 4 in Appendix K of Volume 4 of the Application be updated for a maximum return flow rate of 10.1 mgd.

TABLE 3  
**Summary of HEC-RAS Model Simulation Results for Return Flow at the Discharge Location**

Root River Flow Scenario	River Flow Rate (cfs)	Return Flow Rate (cfs)	River Flow Rate with Return Flow (cfs)	Percent Increase in River Flow Rate (%)	Increase in water depth (ft)	Percent Increase water depth (%)	River Average Velocity (fps)	River Average Velocity with Return Flow (fps)
Low Flow	3	15.6	18.6	520%	0.59	52%	0.11	0.38
2-year	1030	15.6	1045.6	1.51%	0.04	0.46%	1.54	1.53
5-year	1720	15.6	1735.6	0.91%	0.03	0.30%	1.47	1.47
10-year	2300	15.6	2315.6	0.68%	0.03	0.27%	1.48	1.48
25-year	3180	15.6	3195.6	0.49%	0.02	0.16%	1.56	1.57
50-year	3940	15.6	3955.6	0.40%	0.01	0.08%	1.66	1.66
100-year	4820	15.6	4835.6	0.32%	0.02	0.14%	1.75	1.76

TABLE 4  
**Summary of HEC-RAS Model Simulation Results for Return Flow at the Steelhead Egg Harvesting Facility**

Root River Flow Scenario	River Flow Rate (cfs)	Return Flow Rate (cfs)	River Flow Rate with Return Flow (cfs)	Percent Increase in River Flow Rate (%)	Increase in water depth (ft)	Percent Increase water depth (%)	River Average Velocity (fps)	River Average Velocity with Return Flow (fps)
Low Flow	5.6	15.6	21.2	279%	0.47	69%	0.63	0.84
2-year	1927	15.6	1942.6	0.81%	0.03	0.41%	3.44	3.45
5-year	2843	15.6	2858.6	0.55%	0.02	0.23%	3.90	3.91
10-year	3510	15.6	3525.6	0.44%	0.02	0.21%	4.14	4.15
25-year	4421	15.6	4436.6	0.35%	0.01	0.09%	4.50	4.51
50-year	5148	15.6	5163.6	0.30%	0.01	0.09%	4.82	4.83
100-year	5916	15.6	5931.6	0.26%	0.01	0.08%	5.04	5.05