The following is a study to estimate the amount of water flowing over the Eagle Lake spillway dam. Rolf Tiedemann, milfoil project coordinator, prepared it, November 2009.

There are several variables that are included in the calculation, the first being the depth of water flowing over the spillway dam as measured approximately 4 feet back from the dam proper. These depths are expressed in base flow over dam in inches. They range from 1 inch to 4.5 inches and are typical of the range of flows depending on season and prior rainfall amounts. There are times of the year where there is no flow at all going over the spillway. Lake level can be adjusted within the range of about 10 inches by addition or removal of existing boards designed specifically for the spillway. A DEC agreed base level of plus/ minus 4 inches from the “zero mark”, as measured on a gauge located at the Route 74 causeway, is the seasonal target.

The second variable is the width of the spillway itself. An actual width measurement of 7 feet or 84 inches was used in the flow calculations.

The chart that follows uses the above variables to calculate various flow combinations. These calculated flows are based on the information for “calculating flows for micro hydro electric generators” and was found in the manual “The Stream Engine” published by Energy Systems and Design Ltd., 07-2008.

Copies of the research documents are included for reference.

	Flow calculation for Eagle Lake Spillway Dam				
Base flow over dam in inches	Base flow GPM @ 1 inch dam width	Water flow GPM @ 84 inch dam width	Cu. Ft. per minute @ 84 inch dam width		
1.0	3	252	33.69		
1.5	5.5	462	61.76		
2.0	8.5	714	95.44		
2.5	11.8	991	132.50		
3.0	15.5	1302	174.04		
3.5	19.5	1638	218.95		
4.0	23.9	2008	268.36		
4.5	28.5	2394	320.01		
1 gallon = 7.481 cu. Ft.					
Dam width is 7 feet or 84 inches					
	data compiled by R. Tiedemann			Nov-09	


Eagle Lake
Property Owners Inc.

The Stream Engine

Personal Hydropower

Ownerôs Manual

PLEASE READ CAREFULLY

Made in Canada

by

Energy Systems and Design Ltd.
PO Box 4557
Sussex NB
Canada E4E 5L7

Phone +1 (506) 433-3151
Fax +1 (506) 433-6151
Email: support@microhydropower.com
Website: www.microhydropower.com

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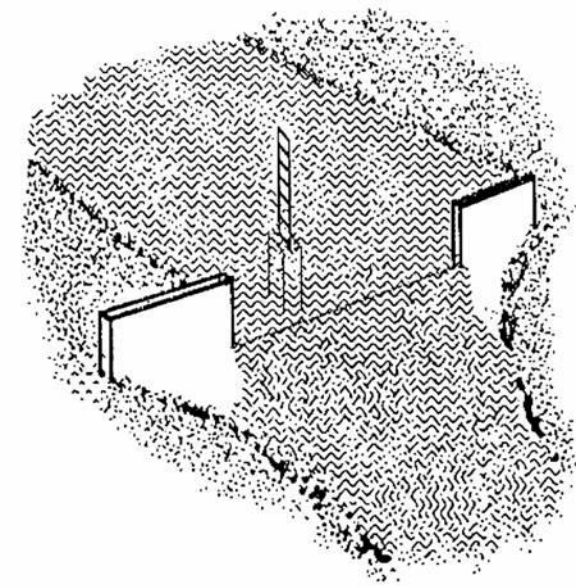
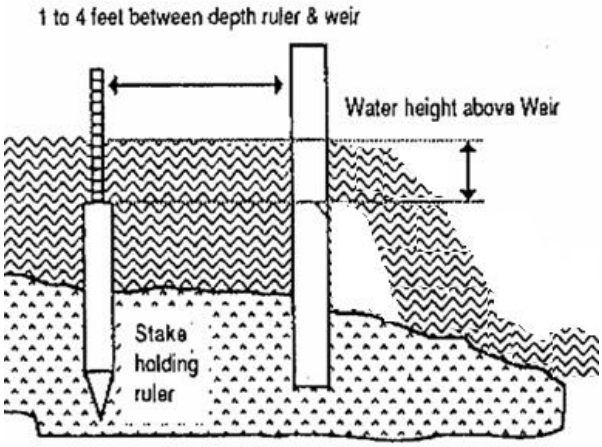
Another technique is to use a surveyor's transit. This method can also be approximated using a carpenter's level using a measuring stick or a "story pole." This technique is also done in a series of steps to arrive at the overall head. A variation on this method is the use of altimeters. GPS equipment could also be used to measure elevation.

FLOW MEASUREMENT

The easiest method to measure small flows is to channel the water into a pipe using a temporary dam and to fill a container of known volume. Measuring the time to fill the container enables you to calculate the flow rate.





WEIR MEASUREMENT TABLE

Table shows water flow in gallons/minute (gpm) that will flow over a weir one inch wide and from 1/8 to 10-7/8 inches deep.

Inches		1/8	1/4	3/8	1/2	5/8	3/4	7/8
0	0.0	0.1	0.4	0.7	1.0	1.4	1.9	2.4
1	3.0	3.5	4.1	4.8	5.5	6.1	6.9	7.6
2	8.5	9.2	10.1	10.9	11.8	12.7	13.6	14.6
3	15.5	16.5	17.5	18.6	19.5	20.6	21.7	22.8
4	23.9	25.1	26.2	27.4	28.5	29.7	31.0	32.2
5	33.4	34.7	36.0	37.3	38.5	39.9	41.2	42.6
6	43.9	45.3	46.8	48.2	49.5	51.0	52.4	53.9
7	55.4	56.8	58.3	59.9	61.4	63.0	64.6	66.0
8	67.7	69.3	70.8	72.5	74.1	75.8	77.4	79.1
9	80.8	82.4	84.2	85.9	87.6	89.3	91.0	92.8
10	94.5	96.3	98.1	99.9	101.7	103.6	105.4	107.3

Example of how to use weir table:
Suppose depth of water above stake is 9 3/8 inches. Find 9 in the left-hand column and 3/8 in the top column. The value where they intersect is 85.9 gpm. That's only for a 1-inch weir, however. You multiply this value by the width of your weir in inches to obtain water flow.

The weir method is more versatile and may prove useful for higher flows. This technique uses a rectangular opening cut in a board or piece of sheet metal set into the brook like a dam. The water is channeled into the weir and the depth is measured from the top of a stake that is level with the edge of the weir and several feet upstream. Looking at the chart that follows will enable you to convert the width and depth of flowing water into gallons per minute.

Measuring the flow at different times of the year helps you estimate maximum and minimum usable flows. If the water source is seasonally limited, you may have to depend on some other source of power during dry times (solar, wind). Keep in mind that a reasonable amount of water must be left in the stream (Don't take it all, that water supports life forms).

When head and flow are determined, the expected power output can be determined from the following chart. Keep in mind that chart values represent *generated* output and that actual power delivered to the batteries will be reduced by transmission lines, power converters, and other equipment required by the system. All systems should be carefully planned to maximize power output.

Stream Engine Output in Watts (Continuous)

Net Head		Flow Rate Liters/sec (Gallons/min)						
Meters	Feet	0.67 (10)	1.33 (20)	2.50 (40)	5.00 (75)	6.67 (100)	7.50 (112)	9.50 (150)
3	10	-	20	40	75	100	130	150
6	20	15	40	80	150	200	250	350
15	49	45	100	200	375	500	650	800
30	98	80	200	400	750	1000	*	*
60	197	150	400	800	1500	*	*	*
90	295	200	550	1200	*	*	*	*
120	394	300	700	1500	*	*	*	*
150	492	400	850	1900	*	*	*	*

* In these higher output situations, it may be worthwhile to utilize more than one Stream Engine.

Google 1 gal = cubic ft / hr Search Advanced Search

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Conversions & Formulas

1 cubic foot (**cu ft**, **ft** 3). = 7.481 **gallon**; = 29.922 quart; = 59.844 pint; = 62.426 lb (water)
... 1 gallon per hour (gph, **gal/hr**). = 3.785 liter per hour **...**
Length - Weight - Area - Volume
www.bestfish.com/convert.html - Cached - Similar

WikiAnswers - How many **cubic feet** are in a **gallon**

Math question: How many **cubic feet** are in a **gallon**? Gallons per **cubic foot 1 cubic foot** = 7.48051945 US gallons1 US **gallon** = 0.133680556 **cubic feet** Also, **...**
wiki.answers.com/Q/How_many_**cubic_feet**_are_in_a_**gallon** - Cached - Similar

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1 us **gallon cubic feet**? Cubit **feet** to a **gallon**? **Cubic feet gallon** water? **...** Cubit **feet** in a uk **gallon**? **1 gallon** water **cubic feet**? How many **feet** in a **gallon ...**
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1 cord (wood) = 128 **cu**. **ft**. **1 cu**. **ft**. = 0.0078 cord. **1** US std. **gal**. = 231 **cu**. in. **...** 117 BTU/(**hr**-**ft**-°F) x (.293 watt-**hr**/BTU) x (1.8°F/°C) x (**ft**/12 in. **...**
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