

Fern Lake Flow Analysis

This data analysis was performed as part of a laboratory assignment for Intro to Environmental Engineering (ENGR 115) at Humboldt State University. During this lab, students measured the approximate volume of water in the stream channel which feeds into Fern Lake (a small lake near HSU campus). Using this data along with the approximate volume flowing out of the lake as well as acknowledging the average monthly evaporation for the month of November, we determined that there was a net increase in the volume of the lake and that the lake was not at a steady state.

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Lab 11
Engineering 115

Input Parameter	
Surface Area lake (m ²)	8000
evaporation (inch/Nov.)	1.04

Float			
Inflow method 1	Depth (m)	Width (m)	Length (m)
Trial 1	0.042	0.55	0.85
Trial 2	0.042	0.55	0.85
Trial 3	0.043	0.55	0.85

Velocity Meter			
Inflow method 1	Depth (m)	Width (m)	Channel Area (m ²)
Trial 1	0.042	0.55	0.0231
Trial 2	0.042	0.55	0.0231
Trial 3	0.043	0.55	0.0237

Bucket Method			
Outflow method 1	Bucket Volume (Gal)	Bucket Volume (m ³)	Time (s)
Trial 1	6.17	0.02336	36
Trial 2	6.17	0.02336	38
Trial 3	6.17	0.02336	44

Results	
Total Inflow	Average (m ³ /hr)
Method 1	9.683
Method 2	55.836
Method 3	1.375
Average Inflow	22.298

Total Outflow	Value (m/Nov.)	Lake Surface (m ²)	Lake Evaporation (m ³)/hr
Evaporation	0.03	8000	0.29

3.) Fern Lake isn't in a steady state. The sum of the inputs is larger than the sum of the outputs.

Rate of volume change	Inflow (m ³ /hr)	Outflow (m ³ /hr)	Rate (m ³ /hr)
Inflow - outflow	22.298	0.29	22.004

Rate of depth change	Rate of volume (m ³ /hr)	Surface Area (m ²)	Depth Change (cm/hr)
Rate of volume change	22.004	8000	0.28

Volume (m ³)	Time (s)	Time (hr)	Flowrate (m ³ /hr)
0.019635	6.75	0.0188	10.472
0.019635	8.00	0.0222	8.836
0.020103	7.43	0.0206	9.740
Average Flowrate:			9.683

meter value (m/s)	Flowrate (m ³ /hr)
0.6	49.896
0.8	66.528
0.6	51.084
Average Flowrate:	55.836

Time (hr)	Flowrate (m ³ /hr)
0.01	2.3360
0.01	2.2131
0.01	1.9113
Average Flowrate:	1.3748

Increasing

Increasing