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ENGR 115

This lab was conducted to determine the state of Fern Lake on HSU's campus. This was found by measuring the inflow and outflow of Fern Lake. Three different methods were used, such as the bucket method, the ping pong method and the velocity meter. The bucket was used to measure the outflow and was conducted by timing how fast the bucket filled. The ping pong was used at the inflow and was sent down a section of a stream and recorded how long it took for the ping pong to reach the end point. As for the velocity meter, this just measured the movement of the water at the inflow.

The assumptions made for this lab were that the fish hatchery was not extracting any water from Fern Lake during the time period this lab was being conducted. There was also no source of precipitation. The evaporation was found to be 1.20 in/month found from the CIMIS website for November.

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Input Parameters:	
Surface Area of the lake (m ²)	8000
Evaporation (in/month)(nov)	1.2

Float							
Inflow Method 1	Depth (m)	Width (m)	Length (m)	Volume (m ³)	Time (s)	Time (hr)	Flowrate (m3/hr)
Trial 1	0.036	0.549	1.387	0.027	6.560	0.00182222	15.04
Trial 2	0.036	0.549	1.387	0.027	5.870	0.00163056	16.81
Trial 3	0.036	0.549	1.387	0.027	6.090	0.00169167	16.20
avg. flowrate=							16.02

Velocity Meter					
Inflow Method 2	Depth	Width	Channel Area(m2)	Meter Value (m/s)	Flowrate (m3/hr)
Trial 1	0.042	0.105	0.004	0.061	0.97
Trial 2	0.042	0.105	0.004	0.122	1.94
Trial 3	0.042	0.105	0.004	0.061	0.97
avg flowrate=					1.29

Bucket Method					
Outflow Method 1	Bucket Volume (gal)	Bucket Volume (m3)	Time (s)	Time (hr)	Flowrate (m3/hr)
Trial 1	5	0.668	37.65	0.01046	63.91
Trial 2	5	0.668	38.25	0.01063	62.90
Trial 3	5	0.668	49.09	0.01364	49.01
avg flowrate=					58.61

Results	
Total Inflow	Average (m3/hr)
Method 1	16.0
Method 2	1.3
Method 3	58.6
Avg Inflow	25.3

Total Outflow	Value (m/nov)	Lake Surface (m ²)	Lake Evaporation (m ³ /hr)
Evaporation	0.0305	8000	0.586

Fern Lake is not at a steady state because the inflow is going at a faster rate than the outflow.

Rate of Volume Change	Inflow (m ³ /hr)	Outflow (m ³ /hr)	Rate (m ³ /hr)
Inflow- Outflow	25.307	0.586	24.720

Rate of Depth Change	Rate of Volume (m ³)	Surface Area (m ²)	Depth Change (cm/hr)
Rate of Volume Change	24.720	8000	0.309