Measuring the Flow of a Stream or River

Using the Weir Method (Streams)

There is a minimum flow required for the Papa Pump to operate. You can measure the flow rate from your stream or spring by the following method:

Use a wide board to dam the stream. Before you place the board across the stream, cut a 'V' shape into the top of the board.

When water flows through the 'V', time how long it takes to fill up a liter jug. E.g., If it takes a second to fill up a liter jug then this equates to 60 liters per minute, which is more than the recommended 50 liters per minute minimum to operate a Papa Pump.

Using the Float Method (Rivers)

The float method (also known as the cross-sectional method) is used to measure the flow rate for larger streams and rivers. It is found by multiplying a cross sectional area of the stream by the velocity of the water. To measure the flow rate using the float method:

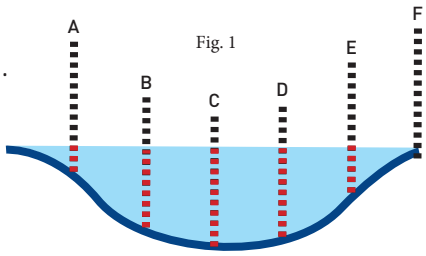


Fig. 1

1 Locate a spot in the stream that will act as the cross section of the stream.

2 Using a meter stick, or some other means of measurement, measure the depth of the stream at equal intervals along the width of the stream (see Fig 1.)

3 Once this data is gathered, multiply each depth by the interval it was taken in and add all the amounts together. This calculation is the area of a cross section of the stream.

4 Decide on a length of the stream (in fig. 2 this is 5 meters) and send a floating object down the river- oranges work well.

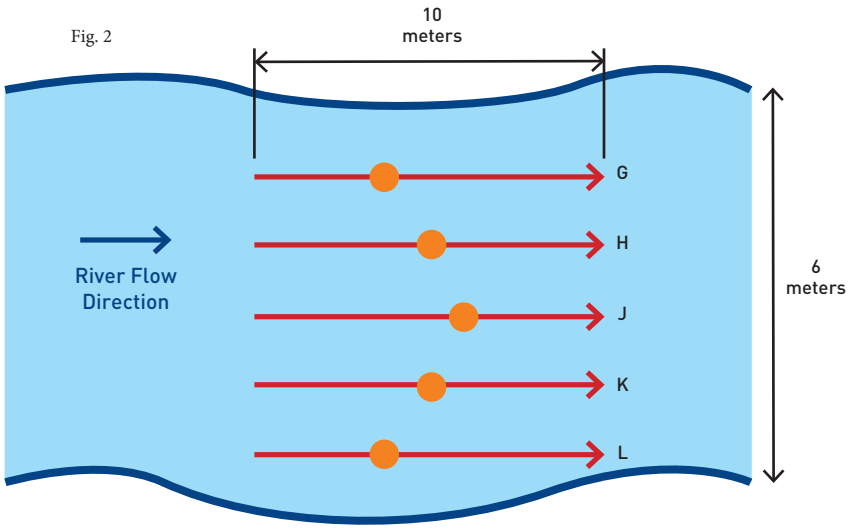
5 Using a stopwatch, measure the time it takes the float to travel down this length. Repeat this 5-10 times and determine the average time taken for the float to travel the stream. Throw the float into the water at different distances from the shoreline in order to gain a more accurate average. (It usually travels faster in the centre of the river).

6 Divide the stream length (step 4) by the average time in step 5 to determine the average velocity.

7 Since the top of the stream flows faster than the bottom, the velocity found in step 6 must be multiplied by a friction correction factor of 0.85. (For muddy, sandy, or smooth bedrock conditions, use a correction factor of 0.9.

8 The corrected velocity multiplied by the cross sectional area yields the flow rate in volume/time. See below for example.

Fig. 2



Example:

Calculating the the cross section area

Measured at intervals of 1 meter

Depths (fig1): A= 0.2m B=0.6m C=0.75mm D=0.55mm E=0.3m F=0

Average: 0.2 + 0.6 + 0.75 + 0.55 + 0.3 + 0 = 2.5m ÷ 6 (number of intervals) = 0.4 meters

0.4 meters x 6 meters (width of river) = **2.4m³** (cross section area over 1 meter)

Calculating the the velocity

Measured over 10 meters with 5 measurements at meter intervals across the river.

Time to travel 10 meters (fig2): G= 30sec H=23sec J=15sec K=24sec L=29sec

Average: 30 + 23 + 15 + 24 + 29 = 121secs ÷ 5 (number of intervals) = 24.2 seconds

Adjust for frictional loss: 24.2 x 0.85 (see step 7) = **20.5 seconds** (velocity)

Calculating the flow rate

The flow rate is 2.4m³ x 20.5 seconds = 0.12 cubic meters/second

which is the equivalent of 120 liters per second or a **flow rate of 7,200 liters / minute**.

If this is unclear, we recommend
'how to measure the flow of a river'
on YouTube or Google.