RIVER HYDRAULICS

Basics we already know:

DISCHARGE: $Q = VA_{x.s.}$

- Q: VOLUME PER UNIT TIME
- V: MEAN VELOCITY
- $A_{x.s.}$: X.S. AREA

Discharge measurement:

EITHER:

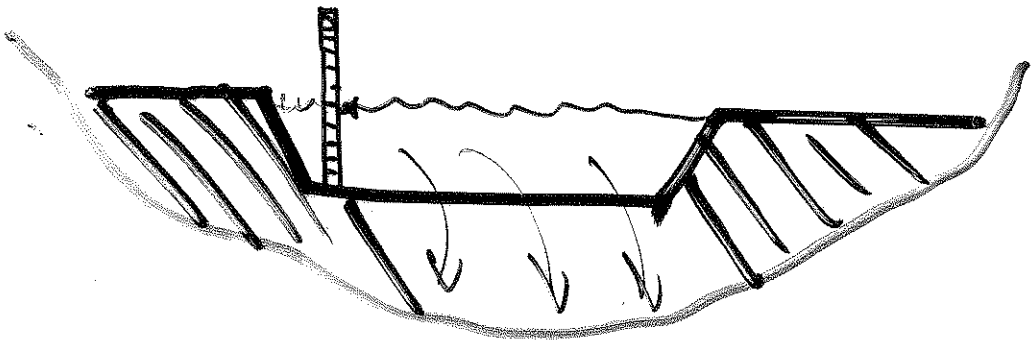
ACTUAL DISCHARGE (Q)

- Use weir or flume that's calibrated
- Depth gives Q from a "rating curve"

MEAN VELOCITY IN KNOWN AREA

- Take velocity measurments with flow anemometer (mechanical, electronic, acoustic-doppler)
- Measure cross-sectional area from bathymetry & depth

WEIR:



- Known geometry & hydraulics
- Measure head or water level
- Use table or eqn for that weir to find Q

ADVANTAGES:

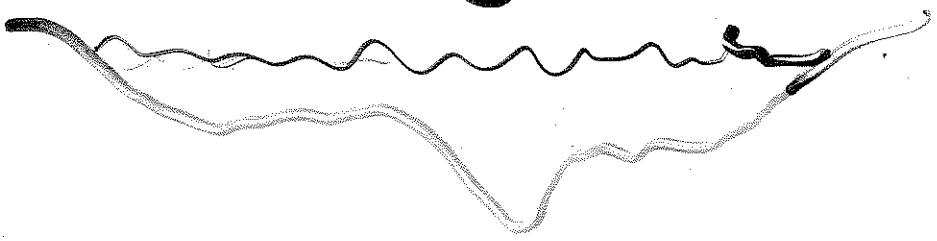
- Simple yet accurate
- Rugged
- Can be easily automated

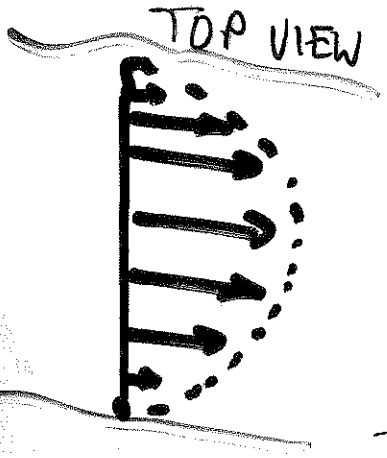
DISADVANTAGES

- Have to divert entire stream or river thru weir
- Disruptive, costly

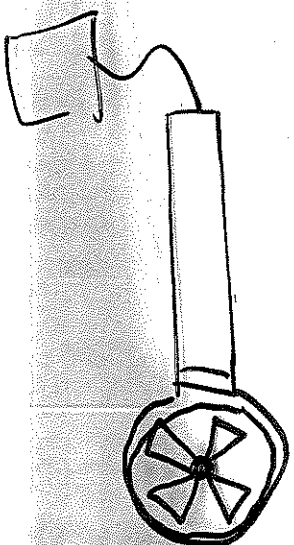
VELOCIMETRY

All sorts of ways to measure velocity directly

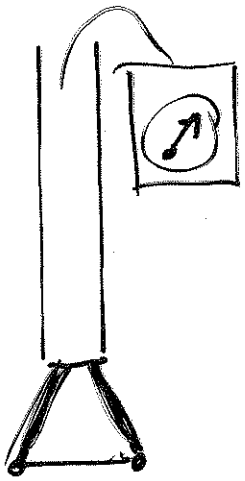




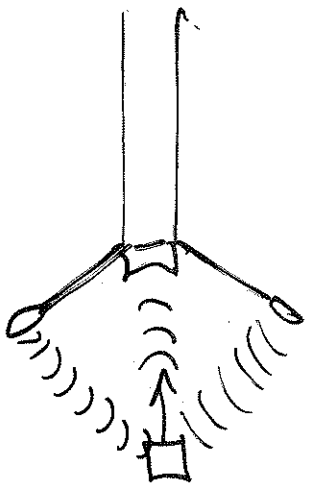
TROUBLE IS: Velocity varies with distance from boundaries



PROPELLER TYPE



"HOT WIRE" ANEMOMETER



ACOUSTIC DOPPLER VELOCIMETER

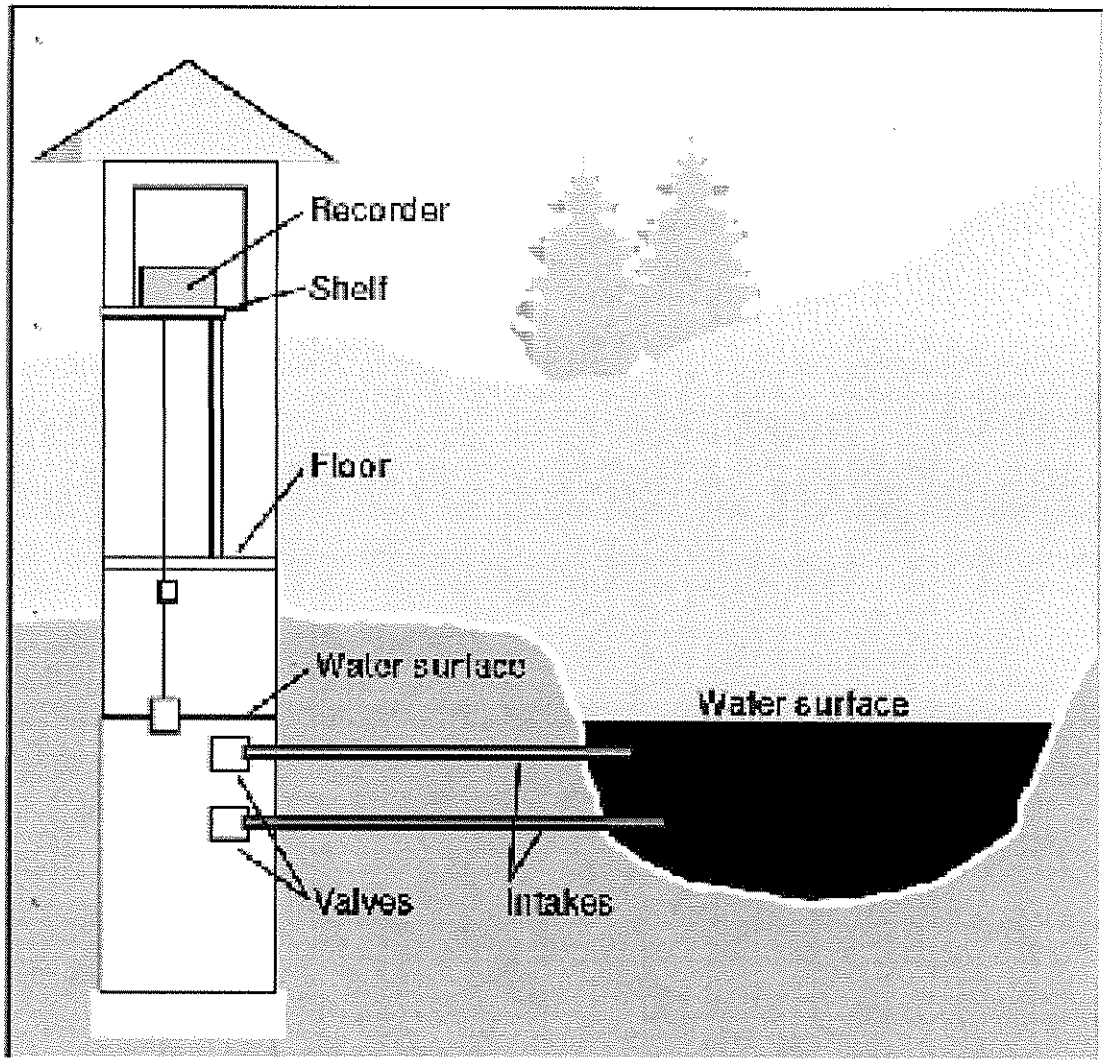
VELOCIMETRY

ADVANTAGES:

- Gives details of flow & velocity distribution, shear
- Portable, no permanent structures
- Can use in any size stream or river

DISADVANTAGES

- Must know A_x to get Q
- A_x varies with Q & is non-linear so must measure A_x for each Q
- Hard to automate, at least for Q
- Labor intensive
- Expensive, finicky equipment


Recorder
Shelf
Floor
Water surface
Water surface
Valves
Intakes