Going With the Flow: **Stream Statistics**

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Project Description

- Create a module that incorporates statistics and geoscience into our liberal arts math course.
- Test module with a small group.
- Eventually use in geoscience courses and linked math and geoscience courses.

The Big Picture

WATER is a VOLATILE issue in Wyoming

- Native American In-stream flow vs Ranching Irrigation use
- Out-of-state demands/rights
- Drought cycles
  - Climate change?
- Pollution issues

Module Goals

By successfully completing this course, students should know **how to** …

- do unit conversions
- use mathrmatics/statistics to solve problems
- collect data to use for a sample
- analyze data numerically and graphically
- compare a sample to a population (or a large data set)

Module Components

Data Collection :

- Stream depth & velocity in the field using calculator-based technology (use to calculate discharge)
- Discharge from USGS data bank website (94 years available for the Wind River at Riverton, WY!)

Technology & Field Experience

Vernier LabPro and
TI-84 Calculator with
flow-rate probe

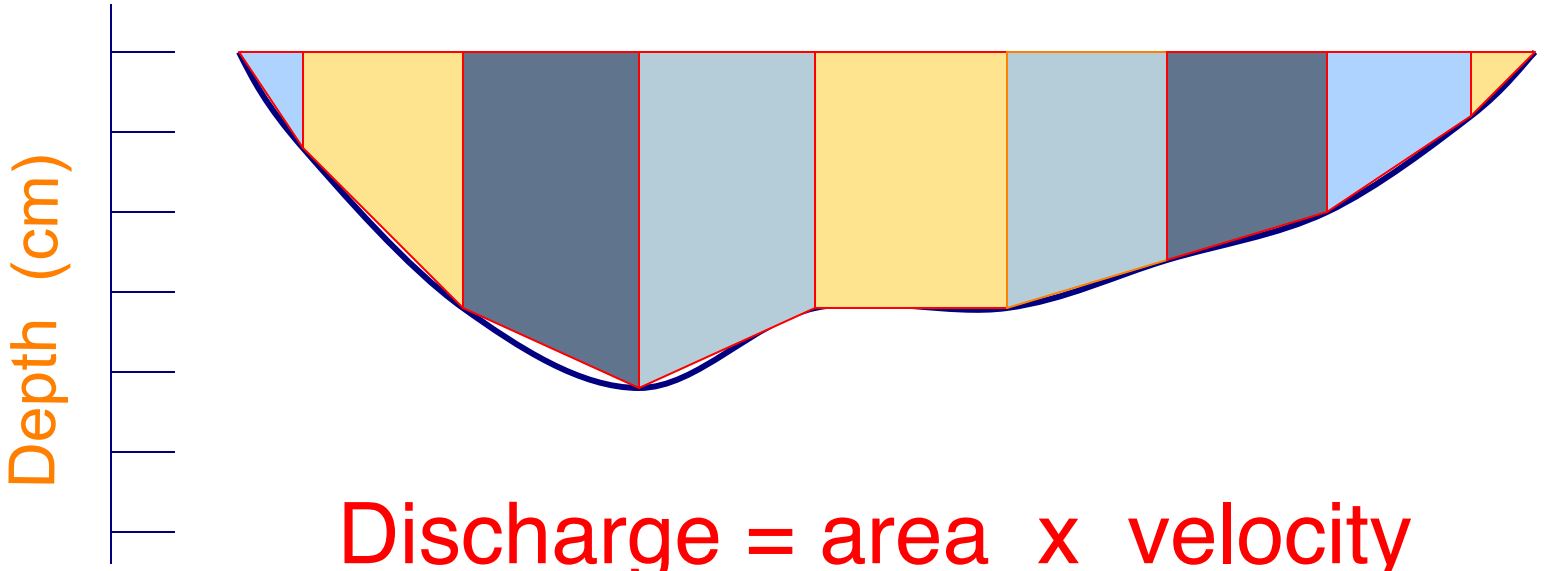
Module Components

Graphing:

- Stream cross-section & area
- Histogram for historical data
  - one specific month for 94 years
  - compare with field data
- Time-series graph
  - several years/sinusoidal

Calculating Area

Using Trapezoids



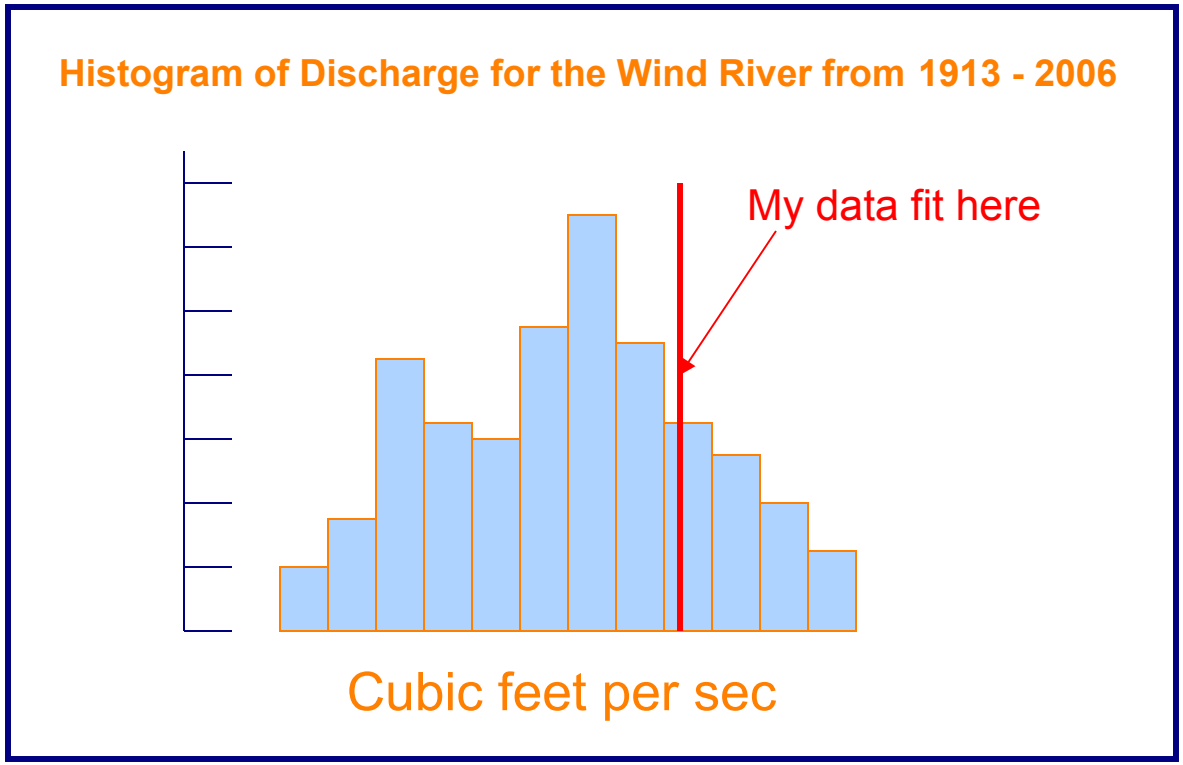
Discharge = area x velocity

Module Components

Numerical Statistics (using Historical Data)

- Measures of
  - Center, Location, Spread
- Box plots
- Compare with field-collected data

Comparing Data



Module Outcomes

A clear understanding and use of:

- Data collection, manipulation and interpretation
- Calculation of mean, median & mode
- Creation of a histogram
- Graphing time series
- Creation of box plots
- Comparison of historical and field data

Other …

[aka things we learned at this Institute]

- Module will be used with a volunteer sub-group of the class.
  - Mistakes and frustrations can be more easily worked out in a small group.
- Comparisons can be made between this statistics project and our traditional survey statistics project.
- Differences between bar graphs and histograms can be visualized and discussed.