Statistics and Models

Environmental Science
Chapter 2.2

Statistics

- Collection and classification of data in the form of numbers
- Batting average
- Running yards
- High temperatures
- Voter polls
- Size of dwarf mussel

Science and Statistics

- Populations
- A group of similar things scientists are interested in
  - Students
  - People living in an area
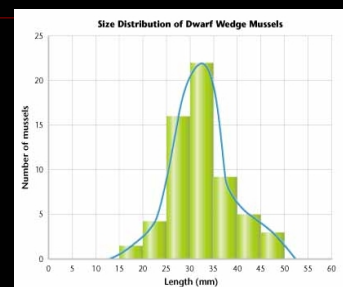 - Species of fresh water mussel
  - Others?

Science and Statistics

- **Mean**
- Average number of something
- Add values and divide by number of values
- Student age
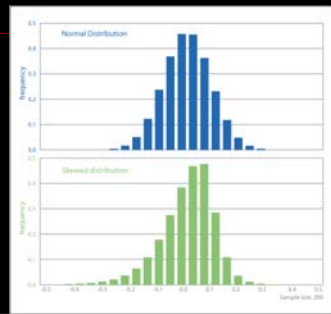- Number of People in a household
- Length of mussels

Science and Statistics

- **Population Distribution "the distribution"**
- Shows data value compared to all other values
- Graph

Normal Distribution – sizes are evenly spread from a center

"Bell Shaped Curve"

- Normal Vs. Skewed Distribution

Science and Statistics

- Probability
- The chance something will happen
- Chance of getting heads in a coin toss
- Chance a student will be 7 feet tall
- Chance of having .5 persons in a house
- Chance of getting a 10 foot mussel?
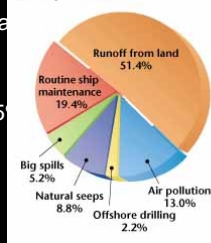- Outlier – data that is unexpected, eliminate!

Science and Statistics

- Sample Size
- Quantity of objects or events data was collected from
- Must be large enough to give accurate information

Science and Statist

- Risk
- Probability (chances) of a unwanted outcome
- 1 in 4 chance of failing
- The risk is ¼ or .25 or 25
- Risk misconceptions…

Figure 11 ► People may worry about the risk of a big oil spill, but as the graph below shows, most of the oil polluting the oceans comes from ordinary sources.
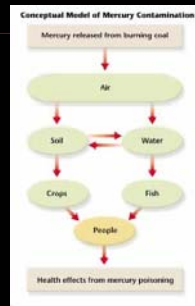
Runoff from land 51.4%
Routine ship maintenance 19.4%
Big spills 5.2%
Natural seeps 8.8%
Offshore drilling 2.2%
Air pollution 13.0%

Science and Statistics - Models

- **Physical Models**
- 3D models you can touch
- Globe
- Atomic compounds
- airplane

- **Graphical Models**
- Maps and Charts
- Ocean Temperatures
- Topographic Map
- Earthquake data

Conceptual Models
- Graphic organizer
- Flow chart

Conceptual Model of Mercury Contamination

Mercury released from burning coal

Air

Soil ⇄ Water

Crops   Fish

People

Health effects from mercury poisoning

- Mathematical Models
- Equations that represent how a process works
- Weather prediction
- System interaction