The Geomatics Academy
Student Handout

Poster Preparation

Topic 1: Urban Heat Island

UHI Background:

- Urban areas tend to be warmer than rural areas.
- This could be explained by the low albedo of urban asphalt and dark-colored roofs:
  - Low albedo (dark colors), such as asphalt, will absorb more sunlight.
  - High albedo (light colors) will reflect more sunlight.
- This could be explained by the lower evaporation from urban pavement:
  - Moist surfaces (like grass or trees) will use energy to evaporate and will be cool.
  - Dry surfaces (like pavement) will use energy to get warmer.

Albedo is the amount of sunlight that an object reflects. An object that reflects half of the light that strikes it has an albedo of 50%. An object that reflects all of the light has an albedo of 100%. What color would a surface be if it had an albedo of 0%?

- We used a light meter to measure the amount of sunlight that shines on an object, and then again to measure the amount of light that reflects off of the object.

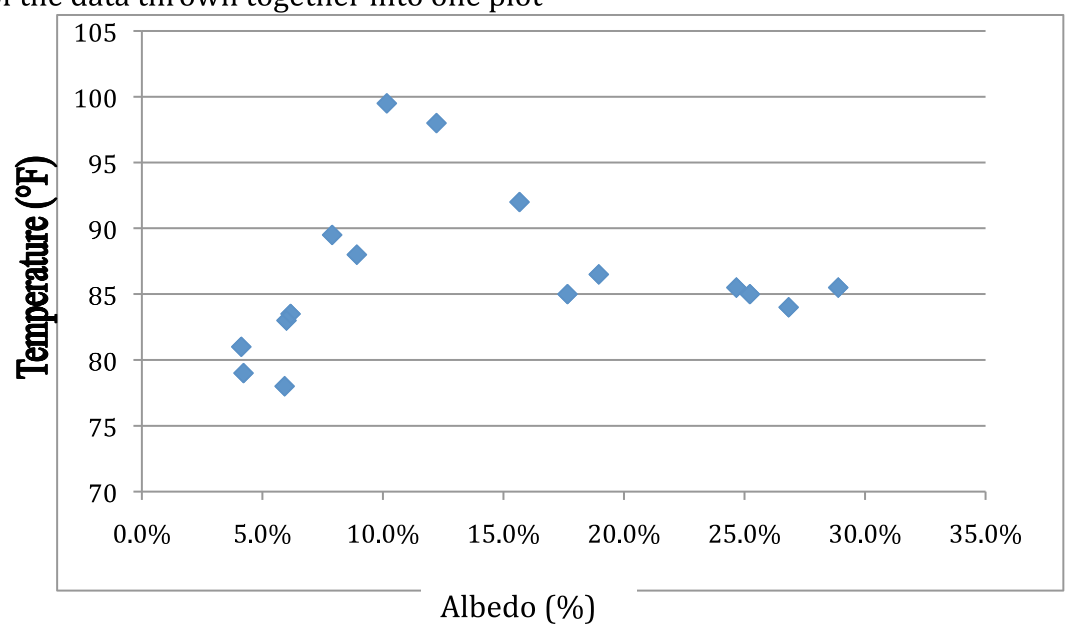
$$\% \text{ Albedo} = \frac{\text{Reflected light}}{\text{Total sunlight}} \times 100$$

Temperature is a measure of how much energy an object has absorbed.

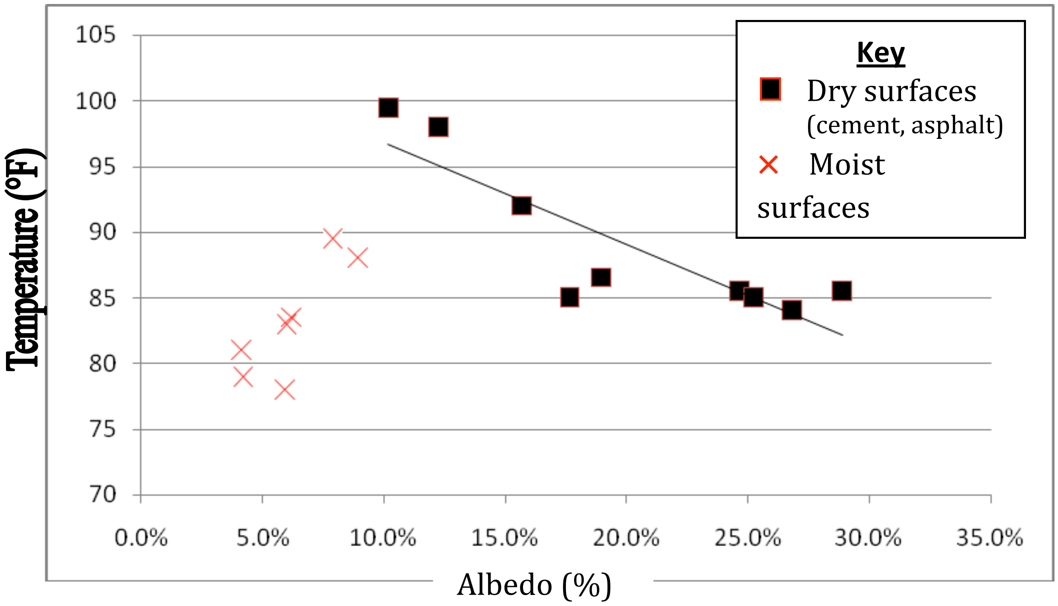
- We used an Infrared Thermometer to measure the temperature of different surfaces.

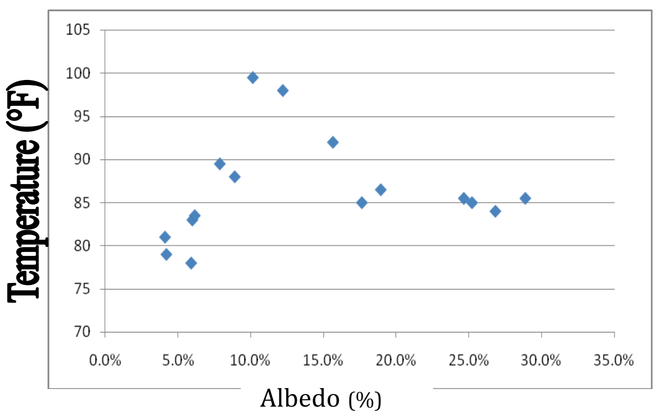
Interpretation of UHI Data:

All of the data thrown together into one plot

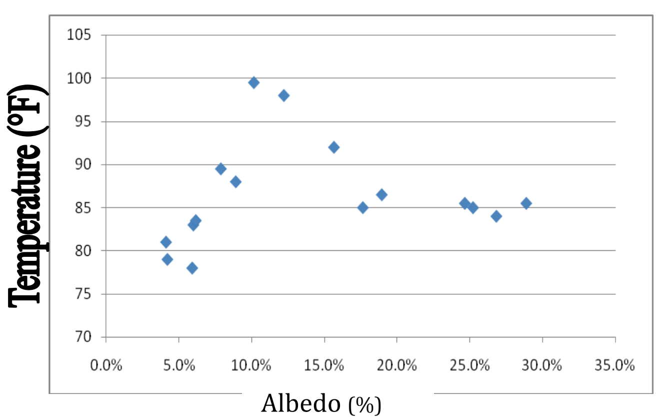


Graph with moist grassy surfaces separated from dry surfaces. Linear equation fit to dry surfaces: **Temp = -77°F * albedo + 104°F**

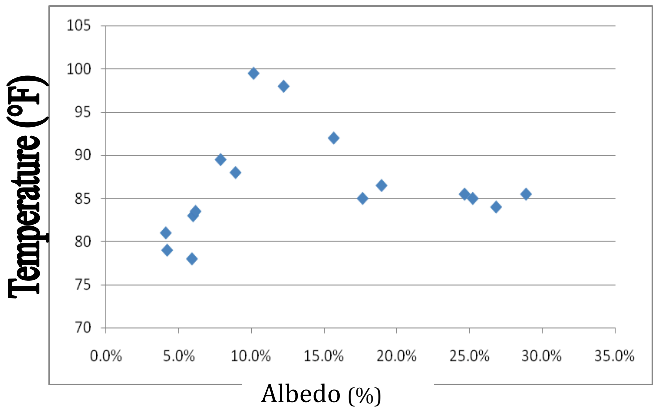




Temp = -77°F * albedo + 104°F



Temp = -77°F * albedo + 104°F



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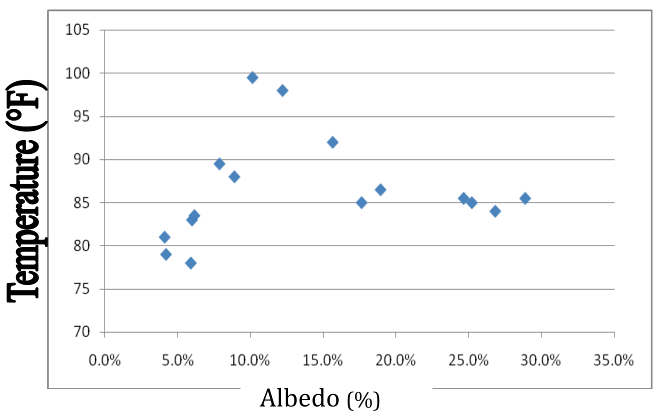


Temp = -77°F * albedo + 104°F

Poster Preparation

You are provided with a series of questions that serve as guidelines for a poster construction. Your answers to these questions will help prepare for narrative texts on your poster.

Introduction:

- What is the Urban Heat Island?
- How does the color of an object (albedo) and evaporation affect the temperature of a surface?

Methodology:

- Describe what we did and the tools we used to investigate the Urban Heat Island (e.g., light meter, infrared thermometer, etc.)
- How did we measure albedo?
- List the different kinds of surfaces for which we measured albedo and temperature.

http://pages.towson.edu/mroberge/geomatics

Results:

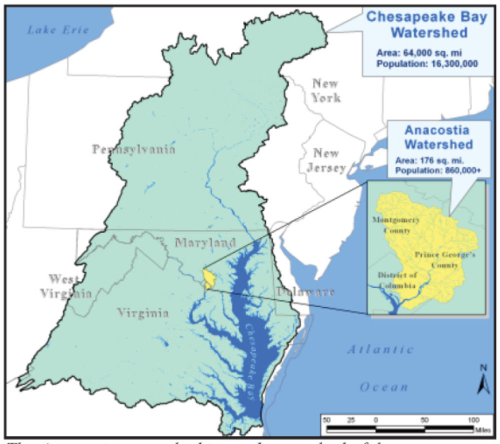
- What were the differences that we found between different surfaces?
- Show a graph of our measurements.
- Were dark surfaces warmer than light surfaces?
- Were moist surfaces warmer than dry surfaces?

Conclusion:

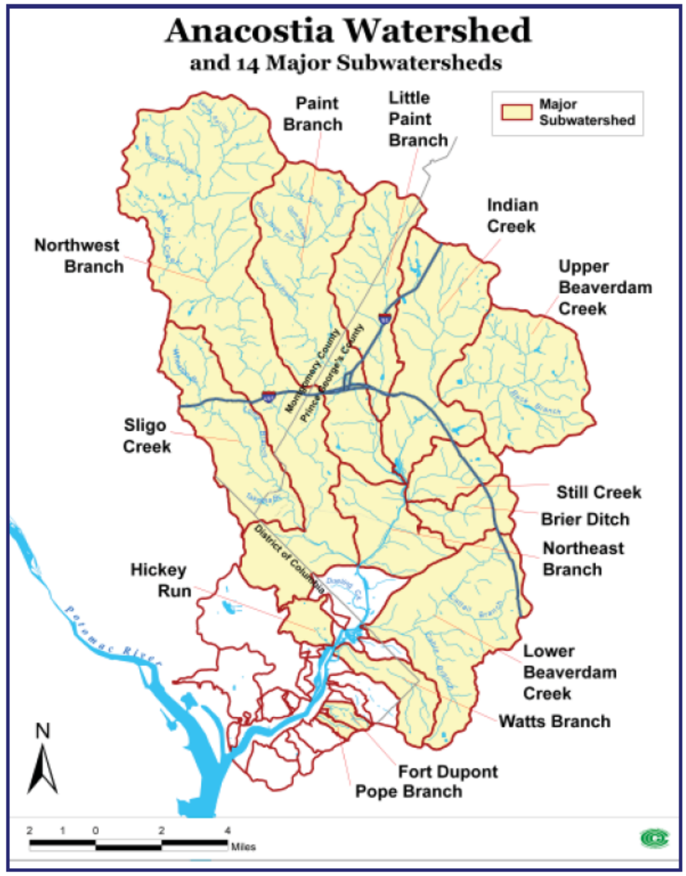
- We measured the impact that albedo and evaporation have on surface temperature. How could we use this information to make cities more comfortable places to live?

Topic 2: Stream Discharge

Watersheds:
For every point along a stream or river, there is a corresponding watershed, which includes all of the land that drains into the stream. As you travel downstream, the watershed becomes larger.



The Anacostia watershed is a subwatershed of the Chesapeake Bay watershed.



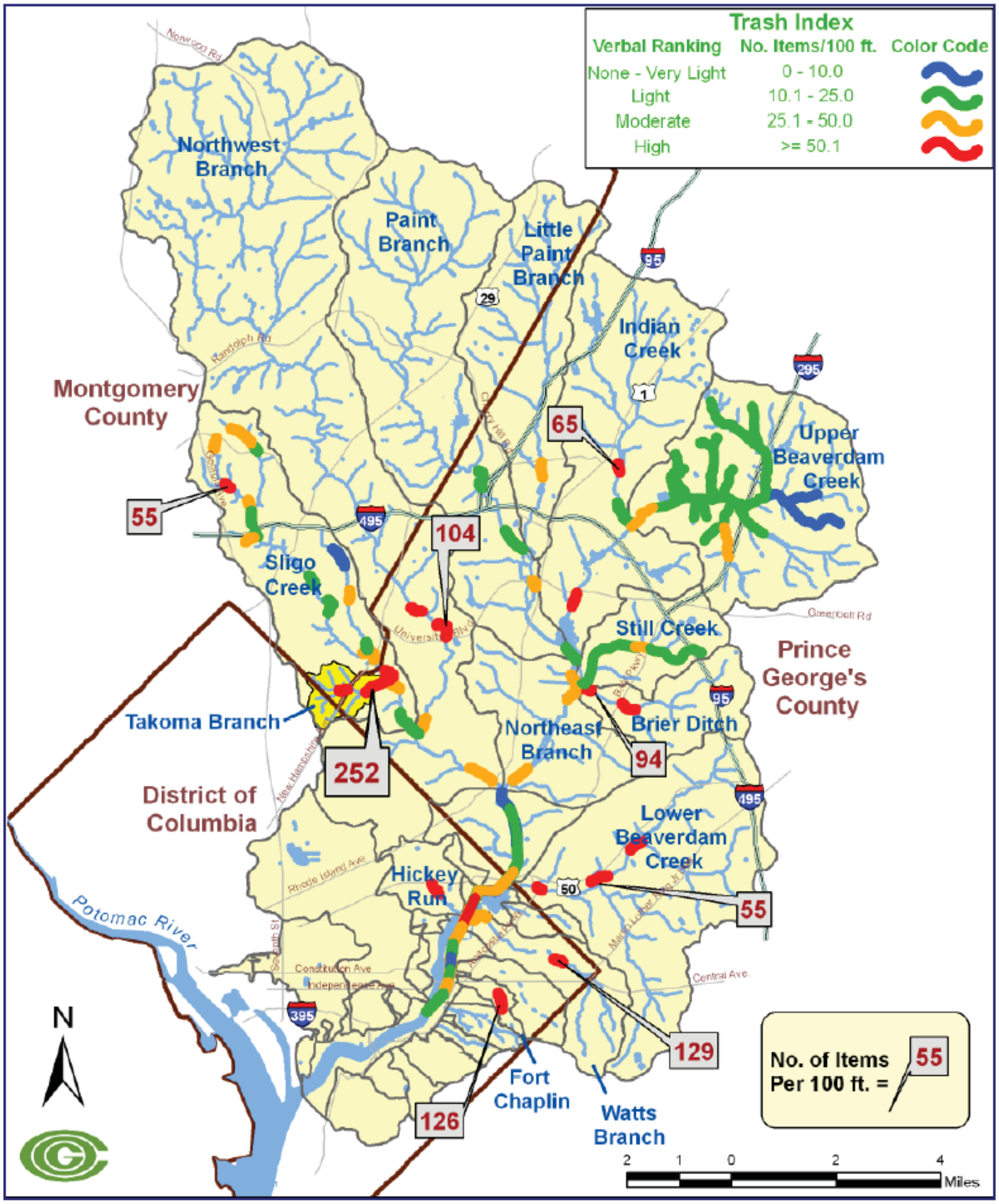
Watersheds:
Fairmount Heights Neighborhood
↓
Lower Beaverdam Creek
↓
Anacostia River
↓
Potomac River
↓
Chesapeake Bay

Water Quality:
Conductivity is the ability of water to conduct electricity. The more stuff that is dissolved in the water, the better that it can conduct electricity. We use conductivity as a general indicator of when there has been a sudden increase in dissolved pollutants.

Dissolved Oxygen is needed by insects and fish to survive. Healthy streams dissolve oxygen as they spill down riffles in the stream, and receive it from aquatic vegetation. Water will lose oxygen as it gets warmer, or when too much organic material (such as from a sewage spill) decays in the water.

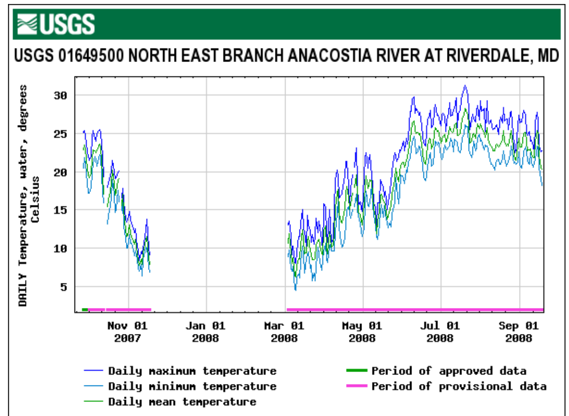
Maps from: Metropolitan Washington Council of Governments. 2007. Anacostia River Watershed: Environmental Condition and Restoration Overview. http://www.anacostia.net/download/Summit/1_AnacostiaOverview.pdf

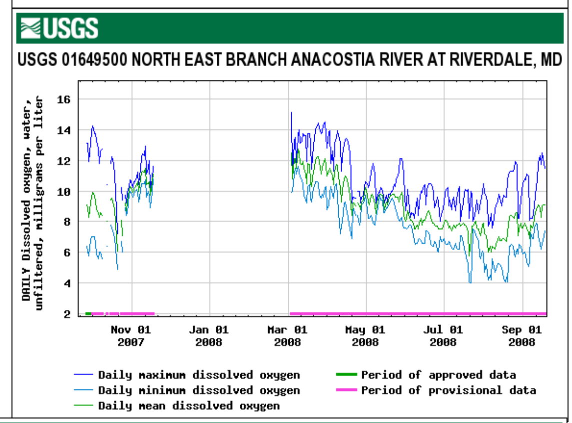
Figure 6. Tributary and Tidal River Shoreline Trash Survey Data, 2003 - 2006



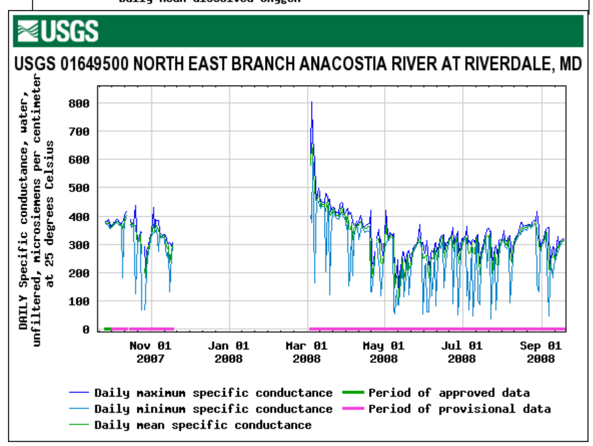
Map from: Metropolitan Washington Council of Governments. 2007. Anacostia River Watershed: Environmental Condition and Restoration Overview. http://www.anacostia.net/download/Summit/1_AnacostiaOverview.pdf

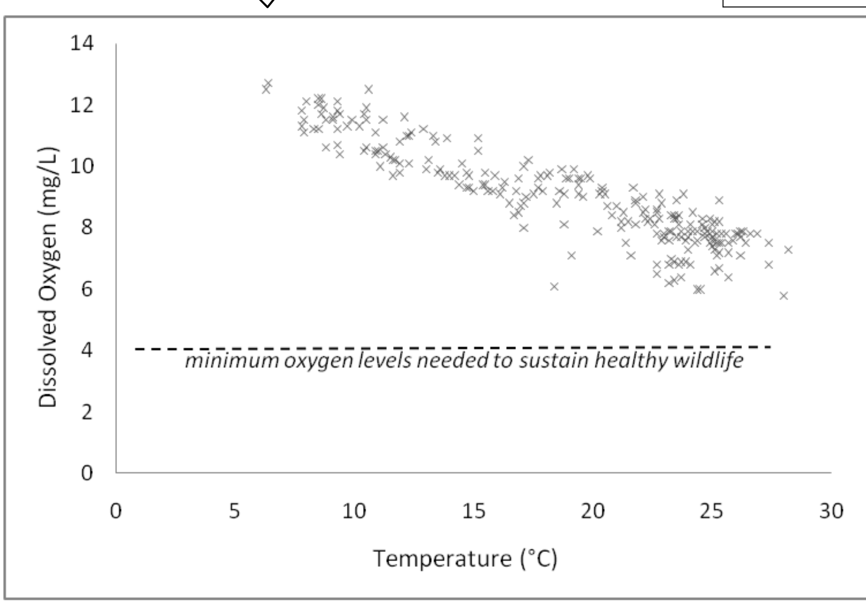
Our measurements for Beaverdam Creek	
Date: *(dd/mm/year)*	
Time: *(hours)*	
Temperature: *(°C)*	
Dissolved Oxygen: *(mg/L)*	
Conductivity: *(uS/cm)*	





Measurements from the Anacostia at Riverdale, MD		
Date	Temp. (°C)	D.O. (mg/L)
9/9/2008	23.0	7.7
9/10/2008	22.2	8.3
9/11/2008	21.8	8.8
9/12/2008	21.8	8.9
9/13/2008	23.8	9.1
9/14/2008	25.3	8.9
9/15/2008	24.9	8.3
9/16/2008	22.1	9
9/17/2008	20.5	9.1
9/18/2008	20.3	9.1



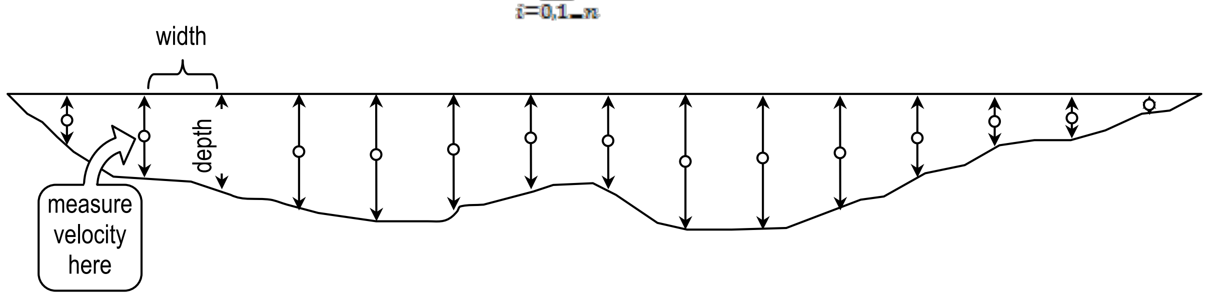


Water quality data from the US Geological Survey, site 01649500. http://waterdata.usgs.gov/md/nwis/

Measuring Stream Discharge:

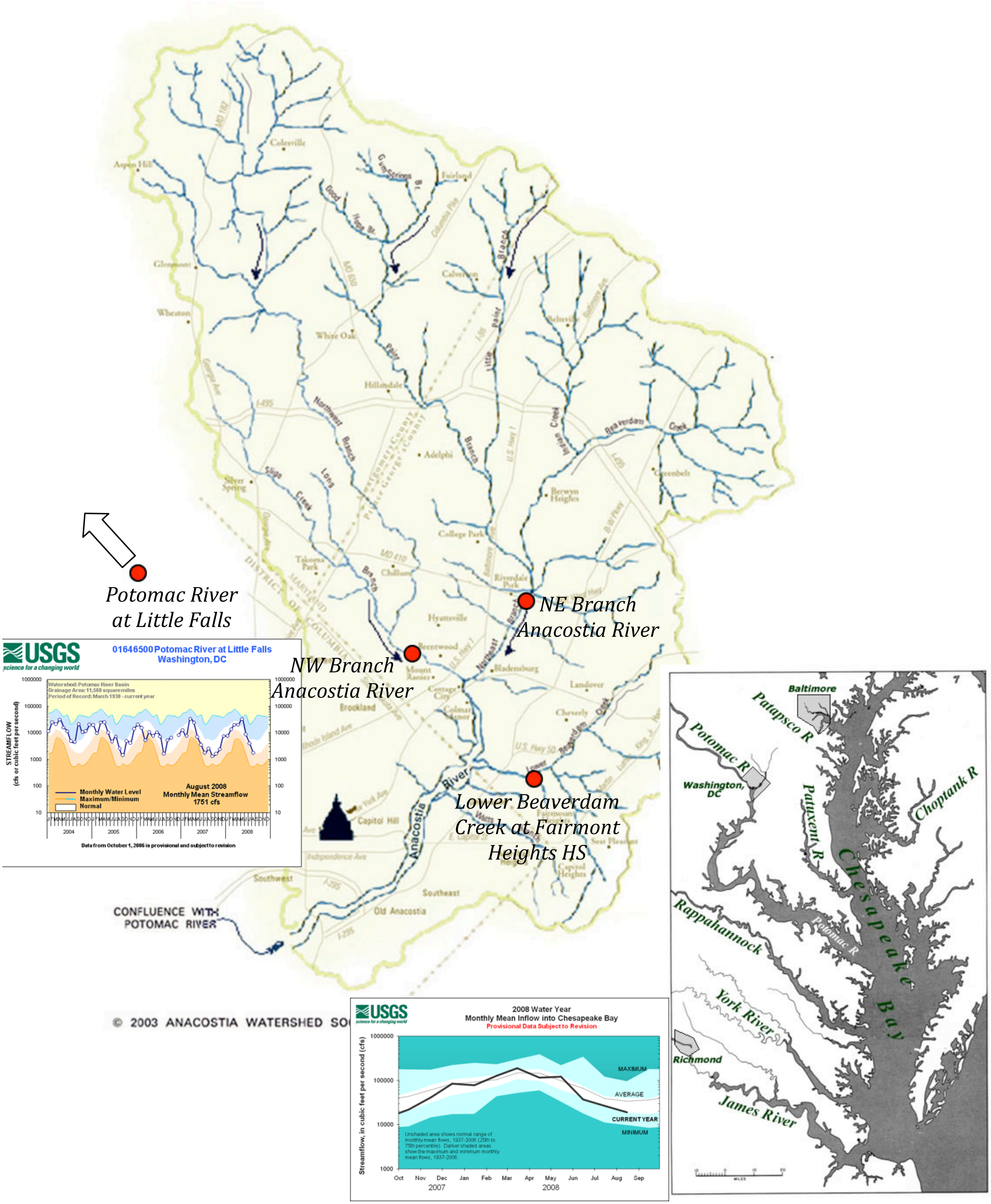
$$Discharge\ of\ a\ stream\ segment = Velocity \times Area\ of\ segment$$

$$Total\ Discharge = \sum_{i=0,1\ldots n}^{n} Width_i \times Depth_i \times Velocity_i$$



i	depth (cm)	width (cm)	velocity (cm/s)	discharge (cm^3/s)	comments
0	3 cm	50	3	450	Chidi, DJ, Marcus, & Dejuan's group
1	11	50	9	4,950	
2	14	50	12	8,400	
3	17	50	16	13,600	
4	15	50	20	15,000	
5	12	50	15	9,000	
6	12	50	6	3,600	
7	11	50	5	2,750	
8	7	50	2	700	
9	.1	50	1	50	
			Sum of all segments:	58,500 cm^3/s = 0.0585 m^3/s	1 m^3 = 100cm x 100cm x 100cm =1,000,000cm^3

i	depth (cm)	width (cm)	velocity (cm/s)	discharge (cm^3/s)	comments
0	5.5 cm	50	2	550	"Group 1"
1	11.5	50	7	4,025	
2	12	50	8	4,800	
3	15	50	13	9,750	
4	12	50	17	10,200	
5	12	50	16	9,600	
6	11	50	10	5,500	
7	11	50	3	1,650	
8	4.5	50	2	450	
9	1	50	1	50	
			Sum of all segments:	46,575 cm^3/s = 0.0466 m^3/s	1 m^3 = 100cm x 100cm x 100cm =1,000,000cm^3


Potomac River at Little Falls
NE Branch Anacostia River
NW Branch Anacostia River
Lower Beaverdam Creek at Fairmont Heights HS
CONFLUENCE WITH POTOMAC RIVER
© 2003 ANACOSTIA WATERSHED SO
USGS
science for a changing world
01646500 Potomac River at Little Falls Washington, DC
Watershed: Potomac River Basin
Drainage Area: 11,560 square miles
Period of Record: March 1930 - current year
STREAMFLOW (cfs or cubic feet per second)
Monthly Water Level
Maximum/Minimum
Normal
August 2008
Monthly Mean Streamflow
1751 cfs
2004
2005
2006
2007
2008
Data from October 1, 2006 is provisional and subject to revision
USGS
science for a changing world
2008 Water Year
Monthly Mean Inflow into Chesapeake Bay
Provisional Data Subject to Revision
Streamflow, in cubic feet per second (cfs)
MAXIMUM
AVERAGE
CURRENT YEAR
MINIMUM
Oct
Nov
Dec
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
2007
2008
Baltimore
Patapsco R
Potomac R
Washington, DC
Patuxent R
Choptank R
Chesapeake Bay
Rappahannock
Potomac R
York River
Richmond
James River

Poster Preparation

You are provided with a series of questions that serve as guidelines for a poster construction. Your answers to these questions will help prepare for narrative texts on your poster.

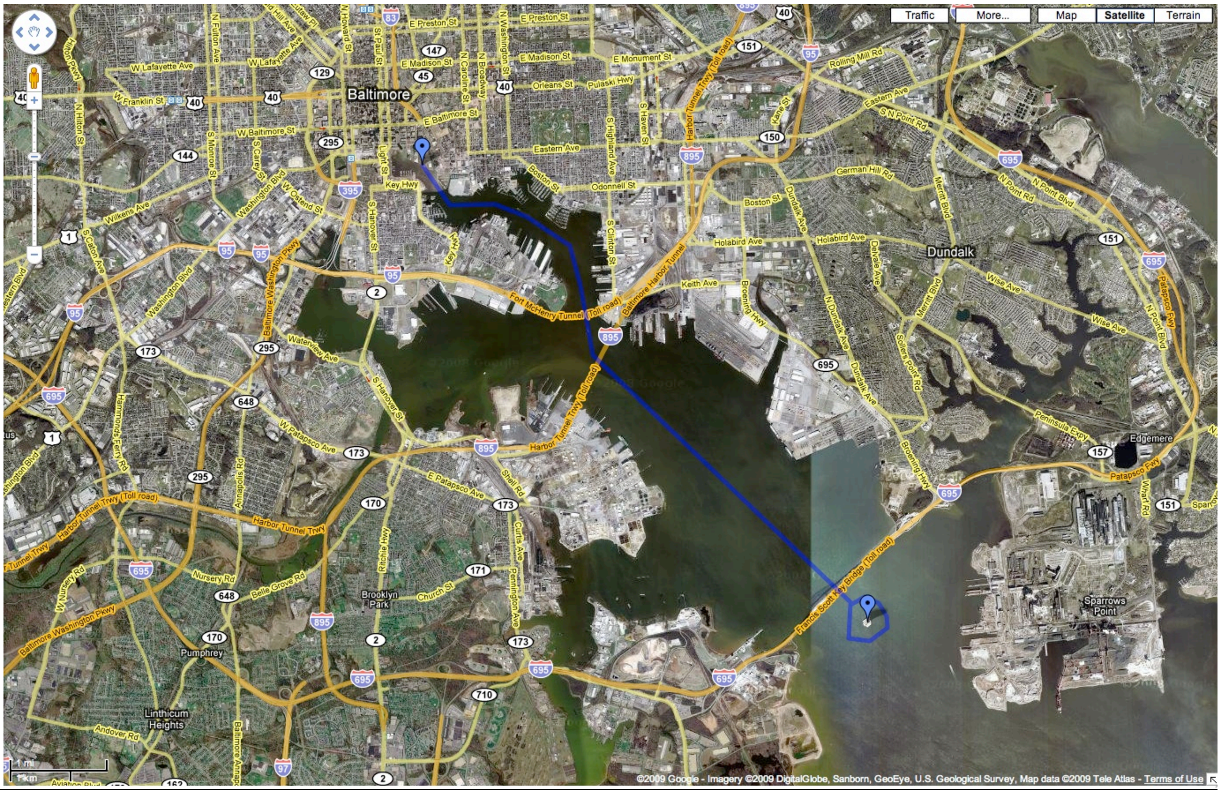
Introduction:
- What were we measuring? (A: stream discharge)
- Why were we measuring it?

Methodology:
- How did we measure stream discharge?
- Describe the tools we used (the electromagnetic velocity meter):

Results:
- What was the stream discharge for the Lower Beaverdam Creek?

Conclusion:
- How did the discharge of this stream compare to other nearby streams?

Topic 3: Living Classroom Boat Trip on the Chesapeake Bay – Crab



Poster Preparation

You are provided with a series of questions that serve as guidelines for a poster construction. Your answers to these questions will help prepare for narrative texts on your poster.

Introduction:

- Describe the importance of the Chesapeake Bay and the Inner Harbor of Baltimore.
- Describe the importance of the Blue Crab.

Methodology:

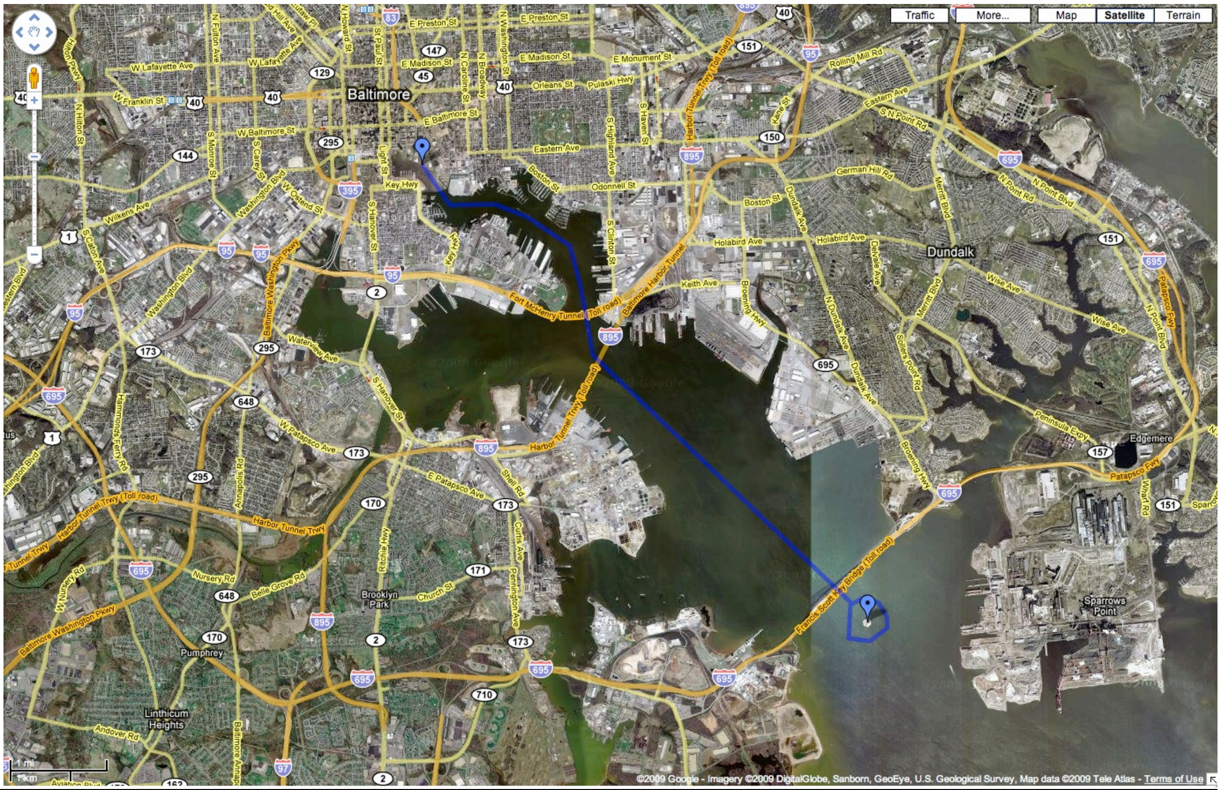
- Describe our trip (how many people, what boat [the Sigsbee, a Chesapeake Bay skipjack run by the Living Classrooms Foundation], where we went.
- How did we catch the crabs?
- How did we study the crabs?

Results:

- What did we learn about crabs?
- Describe the life cycle of a crab (migration, shell).

Conclusion

Topic 4: Living Classroom Boat Trip on the Chesapeake Bay – Jellyfish



Poster Preparation

You are provided with a series of questions that serve as guidelines for a poster construction. Your answers to these questions will help prepare for narrative texts on your poster.

Introduction:

- Describe the importance of the Chesapeake Bay and the Inner Harbor of Baltimore.
- Describe the importance of the jellyfish.

Methodology:

- Describe our trip (how many people, what boat [the Sigsbee, a Chesapeake Bay skipjack run by the Living Classrooms Foundation], where we went.
- How did we catch the jellyfish?
- How did we study the jellyfish?

Results:

- What did we learn about jellyfish?

Conclusion

Topic 5: Barbie Bungee Jumping

Problem:

Your team was hired to work for the Daredevil Entertainment Company ™. This company provides rock climbing, sky diving, "extreme skiing", and cliff diving adventures to the public. To keep up with market demand, the company's board of directors decided to add bungee jumping to its list of offerings. Your task was to simulate the testing of the drop height for a bungee cord that optimized the thrill of jumping without actually hitting the floor.

Procedure:
Each team used a Barbie (or Ken) doll to represent the bungee jumper and a series of rubber bands to simulate the cord. The teams collected data by varying the length of the cord and recording the resulting minimum distance of a safe jump. Each team entered its data into lists on a graphing calculator, eye-balled fit the data with a line, and used the calculator's "line of best fit" to graphically describe the linear relationship between cord length and jump distance. Teams used this relationship to predict the number of rubber bands necessary for an exciting, but safe, two-story jump for Barbie (or Ken). Then, each team represented the relationship algebraically and comparing it to its graphical representation.

Poster Preparation

You are provided with a series of questions that serve as guidelines for a poster construction. Your answers to these questions will help prepare for narrative texts on your poster.

Introduction:
- Describe what we were attempting to do (e.g., describe something in the real world with an equation; model the relationship between two variables.)
- Why would it be useful to describe something that occurs in the real world with an equation?

Methodology:
- Describe what we did.

Results:
- Present and describe the table which showed the number of rubber bands in one column, and the distance fallen in the other column.
- Show a graph of the data.
- What was the equation that we used to describe our data? (the form of the equation was $Y = mX + b$)

Discussion:
- What did the Y-intercept ('b') represent in the real world?

- What did the slope ('m') represent in the real world?
- What happened when we tried to extrapolate the distance the doll fell using a very large number of rubber bands?
- Sometimes our equation provided good predictions; other times not. Describe when our least squares regression line was able to predict the minimum safe jump distance and when it could not. Explain why the equation failed in some circumstances.

Conclusion:

- Why is it useful to describe things in the real-world using equations?
- What sort of problems do you need to be aware of when using equations in this way?

Basic guidelines on how to create a great poster:

- Posters tell stories. A great poster should be readable, legible, well organized, and succinct.
- Keep your poster simple and visually uncluttered. On a poster, columns are easier for the eye to follow than information laid out left to right.
- Each poster should have a title.
- Variety is important. Think about your information. Can you explain something better in a chart? Would bullets make your point more effectively than a solid paragraph? What about photographs?
- When it comes to design, less is more. Limit yourself to three text fonts. You might want to use one font for the title, another for the text and a third for any captions. All capital letters can be used for titles, but otherwise stick to mixed cases just as you would in a normal sentence.
- Color should be used for emphasis. The background of your poster should be a solid color rather than a pattern.
- Remember, poor design can keep your good work from being overlooked.
