Activity Day 1: The Local Environment and its Impact on the Health of the Chesapeake Bay; Writing Résumés

Purpose:

1. for students to learn about the connection their watershed has to the larger environment;
2. to collect environmental data;
3. to introduce students to potential water- and environment-related careers;
4. to teach students how to write a resumé.

Description:

The first activity day is designed to be an exciting introduction to the program and a bridge to the remainder of the activities. The group will meet at FHHS and walk to Beaverdam Creek, located in the Jesse J. Warr Jr. Neighborhood Park, across the street from FHHS. Dr. Roberge and the other project leaders will split the students up and lead them in a series of environmental activities that are organized in a round-robin circuit. The purpose of each activity is to collect environmental data that will be turned in at the end of the day and pooled for later analysis on Activity Day Four. Activities include stream water sampling, measuring stream discharge, and recording the temperatures and solar reflectance values of different natural and man-made surfaces. An activity involving the use of Global Positioning Systems will gather spatial data for use in Activity Day Two. In the case of inclement weather, we will conduct the Day Five activities (D.C. mapping and air photos), and will move the field activity to Day Two.

At the end of the session, students will be introduced to résumé writing skills and given an outline of the background information, academics, activities and experiences that they would include on a résumé for college application. Students will be asked to start to fill-in the outline prior to Activity Day Two. Breakfast and lunch will be provided by the grant.

Staffing:

- Marty Roberge (lead); Linda Cooper, Ming Tomayko, Jay Morgan, Bee Thebpanya
- Ameerah Bello, two FHHS teachers

Materials:

General Materials:

- 30 student handouts
- 30 clipboards or binders
- Signs for each workstation
- Breakfast
- Lunch
- Name tags & markers

GPS workstation:

- 5 GPS, WAAS corrected; with mapping; must be able to download 'trails' data; set to WGS84, decimal degrees.
- Two pre-marked ground survey points for everyone to measure; see set-up page.

Albedo – Temperature workstation:

- 1 Light meter
- 2 simple calculators
- 2 IR thermometers
- 2 Red spirit thermometers
- 'Standards' board: 3 albedo chips; 2 paper towels
- Spray bottle (water)

Water quality workstation:

- 1 water quality meter (Conductivity, temperature, Dissolved Oxygen)
- 3 pairs of hip-waders
- Comparative data

Water velocity workstation:

- 1 Flo-Mate 2000 water velocity meter
- 1 survey tape, 50m
- 2 survey pins
- 3 pairs of hip-waders
- 20+ clips to mark measurement points

General Schedule:

8:15 meet Ameerah at FHHS; set up food; set up park; students arrive and start eating breakfast; informal introductions
9:00 Welcome, formal introductions, description of the day's activities, talk on the watershed and how it is linked to the environment; separate into 4 groups
9:30 Walk to the park
10:00 Start workstations: 90 minutes; 4 stations, 20 minutes each, +10 minutes extra
11:40 End workstations; walk back
12:00 Lunch
12:30 Presentation on Resume writing; Environmental careers
1:00 End of day

Detailed Schedule & Activity Description:

Set Up:

Order Breakfast food,
Order Lunch food
Check weather: if bad, do Activity Day 5
Meet Ameerah; get let into FHHS
FHHS Lobby Set up:
    Set up breakfast foods
    Introduction materials
    Check field equipment; extra batteries;
Set up in Park:
    Is park in good condition? What is water level in stream?
    Set up the marker for the GPS workstation
    Set up the signs for the meeting place for the different workstations

Breakfast:

- Place the information books out for students along with name tags;
- Put school airphoto poster out for students
- Introduce yourself to students as they come in;
- have Ameerah and teachers do a few introductions
- eat with the students!

Introduction:

- Formal introduction of every staff member (Roberge, Cooper)
- Describe the day's activities (round robin, lunch & resumes) (Roberge)
- Presentation on Beaverdam Creek & how it is linked to the Chesapeake Bay (This talk can be given at the park, but it will be easier to hear in the lobby)(Roberge)
- Split students into groups of four; assign group leaders/chaperones; assign first workstation for each group to visit (Roberge)
- Walk to the park (group members introduce themselves to each other)

Round Robin Workstations:
There will be four workstations set up, each with a station leader from the TU faculty who will stay at the station. There will be four groups of students, each with a group leader from FHHS who will stay with this group throughout the day as it visits the stations. The groups will work for about 15 minutes at each station and then will switch to the next station in turn (A→B→C→D→A). All data should be recorded on the accompanying worksheet, and the worksheets and equipment left at the workstation with the workstation leader.

Station A. Urban Heat Island workstation: (Thebpanya)
Within this station students will subdivide into two groups. After a description of the Urban Heat Island phenomena and albedo, they will fill out the accompanying worksheet, first noting the group members, the air temperature, and then describing the general weather. They will then visit about fifteen different sites, each representing some sort of land cover such as grass, dirt, asphalt, or concrete. At each site, they will measure incoming solar radiation and reflected light using the light meter, then calculate the albedo using the calculator. They will also measure the temperature of the surface using the IR thermometer. In addition to the field sites, they will measure a set of 'control surfaces' prepared by the instructor. These surfaces will consist of a series of surfaces that are similar in every respect except for their albedo. A second set of control surfaces will be the same in every respect except that one surface will be dry, while other surface will be moist. Later, the students will attempt to explain which factor, evaporation or albedo, has a greater effect on temperature in urban settings.

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.

Station B. Global Positioning Systems: (Morgan)
The group will be given a GPS unit, and will record the coordinates of the base station, while learning how the GPS units work. Students will then walk to a second station and will record the location of the second station which is 100m to the north. If time permits, the students will use ratios to calculate the circumference of the Earth.

Station C. Water Quality: (Roberge)
The group will talk about water quality and watersheds. Two volunteers will put on hip waders and will take water quality measurements from the stream. As the data are being collected, students will examine graphs of data collected from a nearby stream. They will discuss how different ways of graphing data can illuminate different relationships within the data. Students will then compare the collected data with values on the graphs.

Station D. Water Velocity and Discharge: (Cooper)
Students will discuss what is meant by "measuring stream discharge." Why is this measurement useful? Students will work in a group to measure the water velocity at a marked cross-section. Students will first discuss how one would measure stream discharge. Is the discharge the same for all parts of the stream? Students may visually see differences in water flow or take velocity measurements to verify that velocity is not constant for all locations within the stream. Students will investigate how to partition a stream into segments, find stream discharge for those segments, and then calculate total stream discharge as a sum of the partial stream discharges. After discussions, students will begin the data collection process. A cord that has been marked at regular intervals will be stretched across the stream. Students will measure the depth of the water at each point, as well as the water velocity at half of the depth of the water. Students will sum the discharge for vertical segments of the stream, by first finding the area of that segment and then multiplying it by velocity for that segment.

Lunch: One of the faculty members will leave the group a few minutes early and set up the lunch materials.

Resumes: Students will receive a series of worksheets describing how to write a resume. One faculty member will describe the importance of a resume, and how they are written and used in the workplace.

The Urban Heat Island

Group Members:_____

Date:_____ Time:_____ Weather Conditions:_____ Air temp:___ °F

Description of Surface Type	Reflected light ↑ (lux)	Total Sunlight ↓ (lux)	Albedo (%)	Temperature (°F)

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'll use 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. (A:)

Temperature is a measure of how much energy an object has absorbed.
We'll be using an Infrared Thermometer to measure the temperature of different surfaces.

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

Global Positioning Systems:

Measuring the Earth's circumference

Set up: Each red point on the airphoto is 100m (0.1 km) from the other. Start from the south point, (P1) near the curb, adjacent to the speed hump, and then measure the northern point (P2).

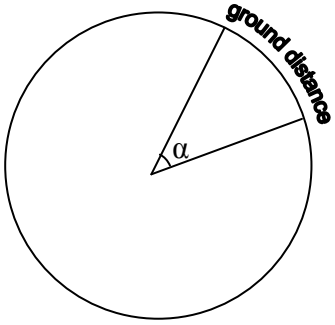
Date:

Time:

Group Members:

	Latitude *(decimal degrees)*	Longitude
P2:		
P1:		
Diff:		

P2:		
P1		
Diff:		



Equations:

$$\frac{0.100\mathbf{km}}{\Delta latitude} = \frac{\alpha}{\mathbf{360°}} \qquad Error = \frac{measured - actual}{actual}$$

Earth's Circumference
pole-pole: 39,911 km
equator: 40,074 km

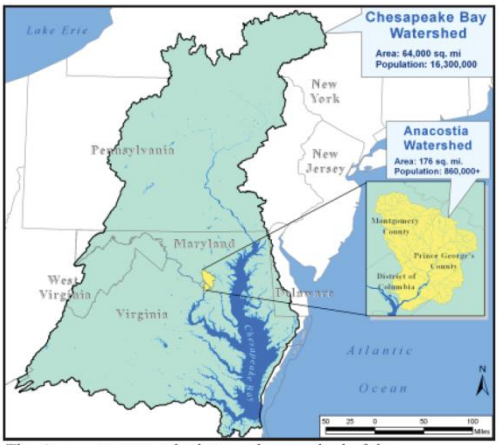
Distance between Fairmount Heights and San Francisco: ~4,000km

Water Quality:

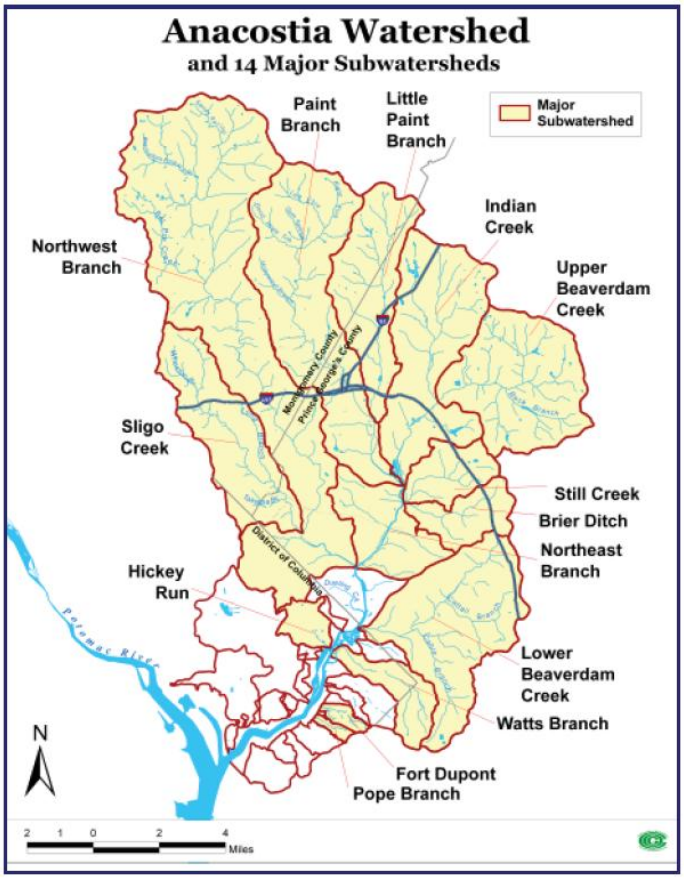
Lower Beaverdam Creek and the Chesapeake Bay

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

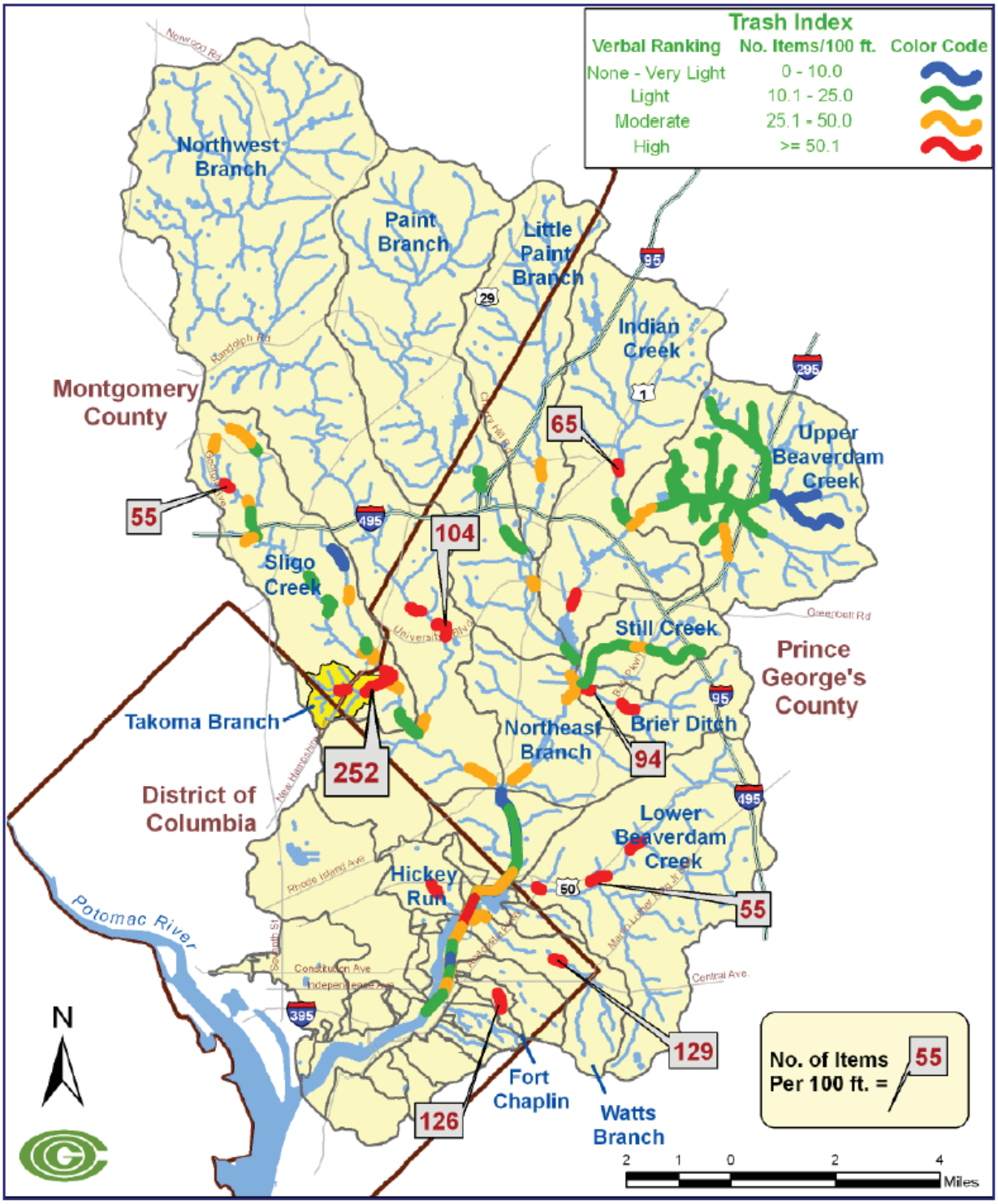
Water Quality:

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

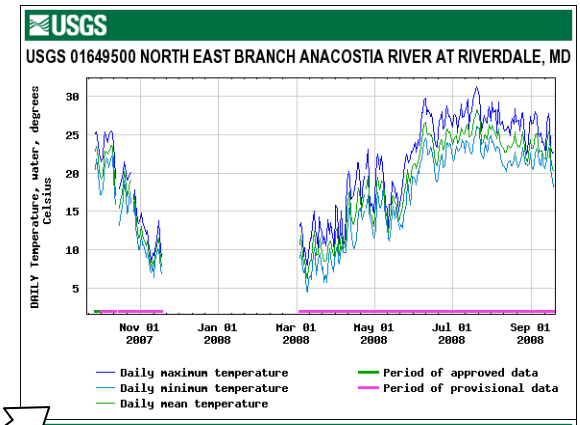


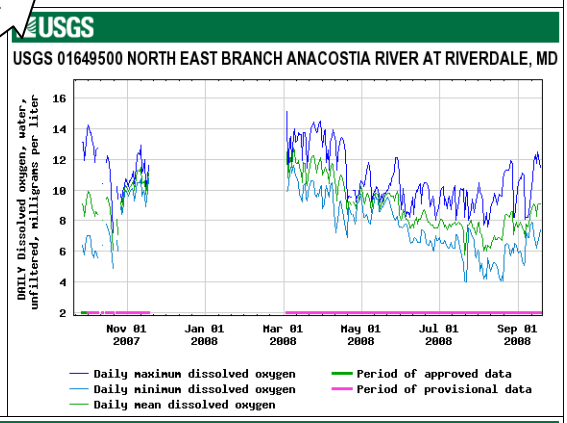
Map from: Metropolitan Washington Council of Governments. 2007. Anacostia River Watershed: Environmental Condition and Restoration Overview. http://www.anacostia.net/download/Summit/1_AnacostiaOverview.pdf

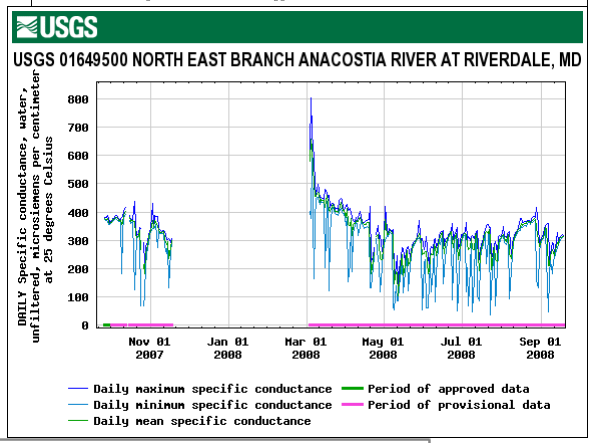
Our measurements for Beaverdam Creek	
Date: *(dd/mm/year)*	
Time: *(hours)*	
Temperature: *(°C)*	
Dissolved Oxygen: *(mg/L)*	
Conductivity: *(uS/cm)*	

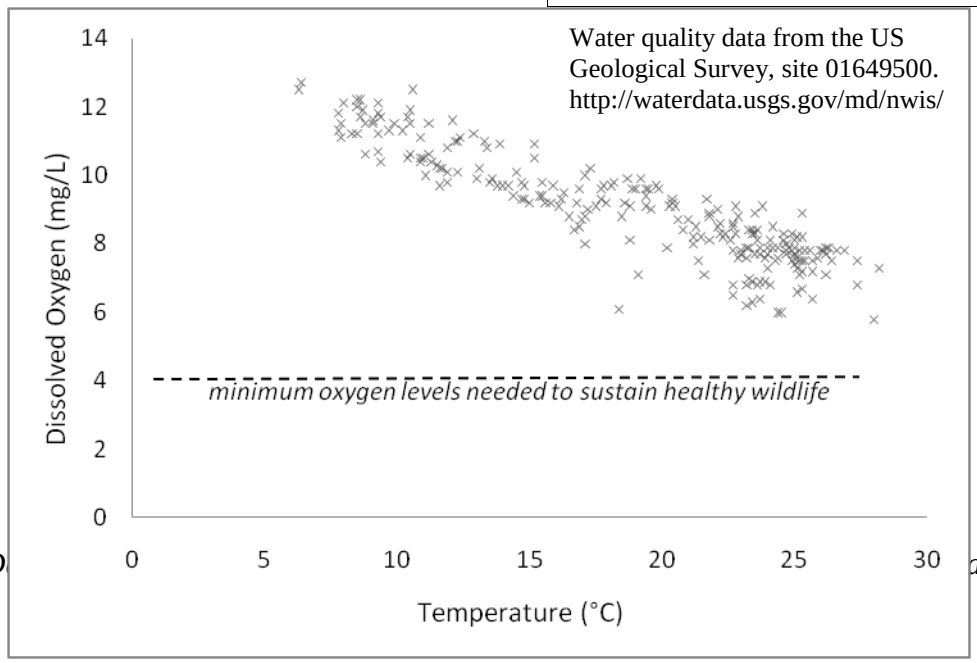
Measurements from the Anacostia at Riverdale, MD

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









D Measuring Stream Discharge

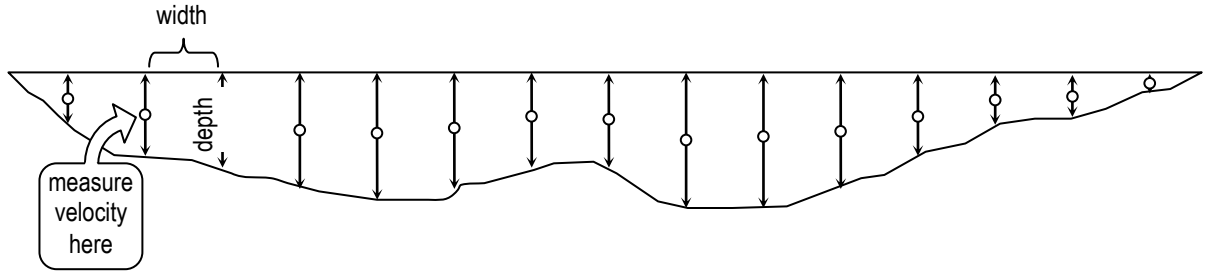
Date: Time: Group Members:

Location of cross-section:

i	depth (m)	width (m)	velocity (m/s)	discharge (m^3/s)	comments
0					
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
			Sum of all segments:		

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

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



Resume Worksheet

Name: _____

I. Personal Information

Address: _____

City: _____ State: _____ Zip: _____

Phone: (_____) _____ E-Mail: _____

II. Education

High School Attended: _____

Location: _____ State: _____

Anticipated Graduation Date: _____

Other Training: _____

Location: _____ State: _____

Date Completed: _____

Awards and Honors

_____

_____

III. Activities

1. School or Outside Activities (clubs, sports, etc.)

_____

_____

2. Community Service

_____

_____

IV. Experience Information

Position title: _____

Organization name: _____

Address: _____

City: _____ State: _____

Dates employed (months & years only) From: _____ To: _____

Name of supervisor(s): _____

Duties and responsibilities: _____

_____

Quality attributes you found important and used successfully in this position.

_____

_____

Specific performance accomplishments or contributions you made to this job:

_____

_____

Combine the duties, qualities and accomplishments together and write a strong job description:

_____

_____

V. Special Competencies

(Include your special talents, skills, training, languages)

_____

_____

_____

_____

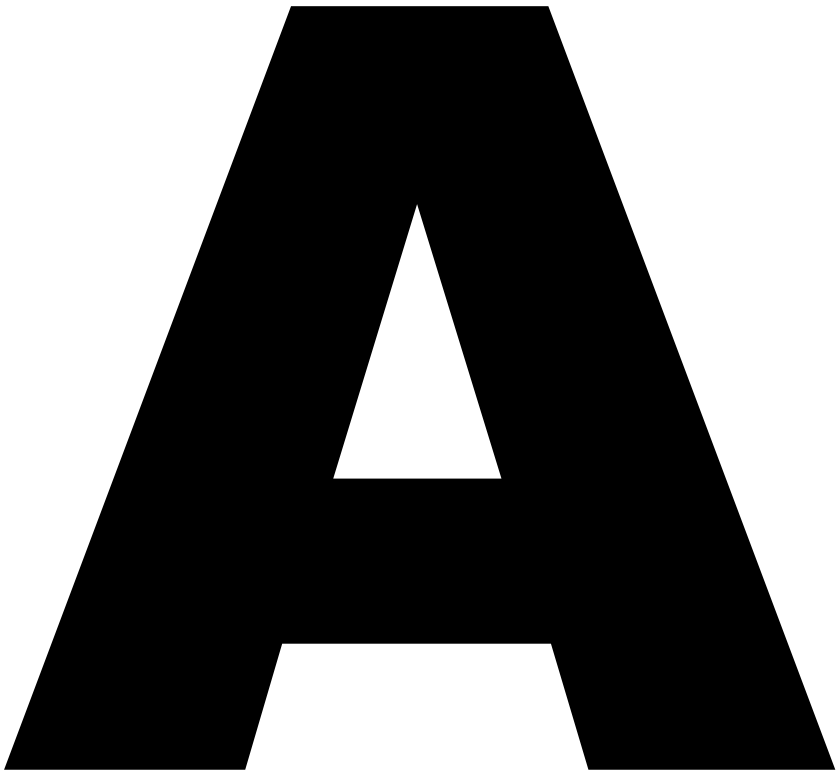
VI. Personal References

(Teachers, employers, activity leaders, coaches, ministers)

1. Name: _____ Phone: (_____) _____
   Address: _____ City: _____ State: ____
   Position: _____

2. Name: _____ Phone: (_____) _____
   Address: _____ City: _____ State: ____
   Position: _____

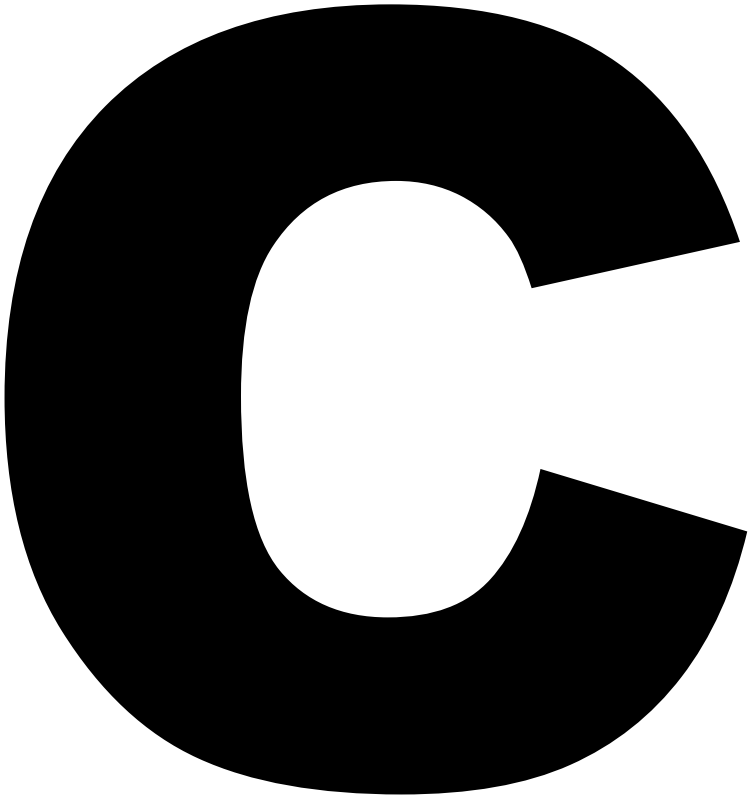
3. Name: _____ Phone: (_____) _____
   Address: _____ City: _____ State: ____
   Position: _____



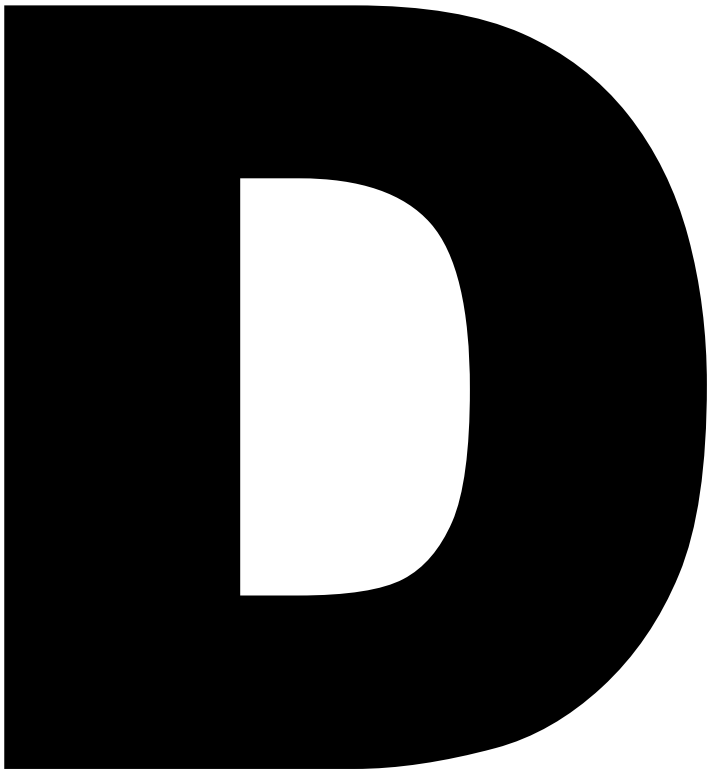
The Urban Heat Island

B

Global Positioning Systems



Water Quality



Measuring Stream Discharge