Name _____   Student ID _____Date _____
Salty, Salty Streams
Watch the video featuring Dr. Kaushal.

1. What do you notice about the streams in Baltimore? Why does Dr. Kaushal point out the old motorcycle?
    There is a lot of trash in the streams in Baltimore. He points out the motorcycle to explain how much stuff is moved by the water, even in small urban streams.

2. Why is Dr. Kaushal studying streams?
    He is studying streams to find out more about pollution in the city. Water is a "reflection of what we've done to the ecosystem" because it carries everything with it, downstream.
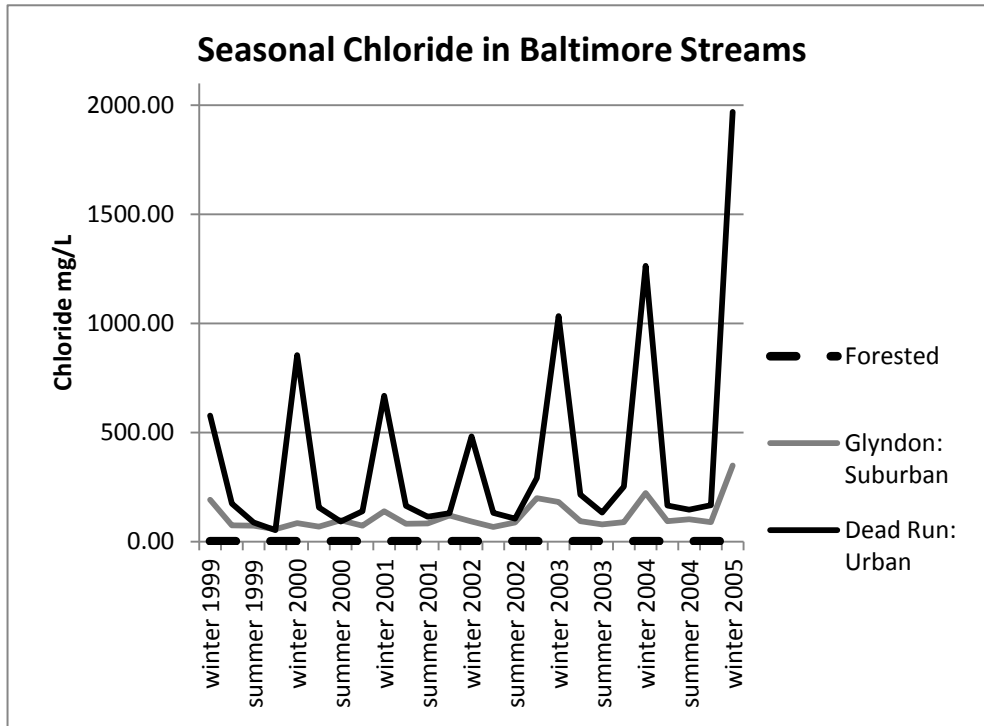
3. How does road salt get into the streams?
    Salt gets washed from the roads into the streams.

4. During the winter months, which streams do you think will have the highest levels of salt: urban, or forested? Why?
    Answers will vary, but many students will think (correctly) that the urban areas with more roads will have higher salt levels.

5. Look at the graph below. It includes data about three types of streams: urban, suburban, and forested streams. The forested stream data is considered the "normal" stream. These data are seasonal averages; scientists in Baltimore collect chloride data every week throughout the year.

Seasonal Chloride in Baltimore Streams

Y-axis: Chloride mg/L (0.00, 500.00, 1000.00, 1500.00, 2000.00)

X-axis: winter 1999, summer 1999, winter 2000, summer 2000, winter 2001, summer 2001, winter 2002, summer 2002, winter 2003, summer 2003, winter 2004, summer 2004, winter 2005

Legend: Forested; Glyndon: Suburban; Dead Run: Urban

a. Which type of stream has the highest chloride levels? *Urban streams.*
b. When do chloride levels typically peak? *In the winter.*
c. Draw a line at 250 mg/L, which is the maximum chloride content allowed in NYC drinking water. Are there streams that are **always** below the "safe" level? If so, which ones? *The forested stream is always safe.*
d. Do these data support the claim you made in Question #4? *Answers will vary.*

6. List the potential sources of variability in your investigation.

Real/natural *– variability due to the ecosystem*	***Human/experimental*** *– variability due to human error, sampling effort or design*
• *Rainfall events could dilute the chloride concentrations in the summer* • *Drought might increase the chloride concentrations in the*	• *Sampling during different times of year might provide different results* • *The sampling equipment might have been different throughout the year* • *Researchers may have collected data in different areas*

summer • _There might have been a chemical spill that cause the high spikes of chloride_ • _Snow or ice events would mean more salt spread on the roads_	• _Data might not have been collected often enough_ • _The sampling equipment might have been working incorrectly or someone used the equipment incorrectly_

7. Based on this information and what you know about land use in your area, make a prediction about how high the chloride levels in your area will be: _Answers will vary._

8. Your teacher will give you a handout with data (or you can download the data into Excel) collected by scientists from a local stream. Use those data to create a graph showing the amount of chloride in the stream. Put each data point on the graph.

9. Describe the changes you see in chloride concentration. _Answers will vary._

10. What might cause some of the differences between the data points?
    There are many things that could causes differences between the data points – there might have been human error, there may be problems with the instruments, or there may be differences in the amount of water, which could cause a decrease in chloride levels as the chloride is diluted.

11. If you used Excel to graph the chloride data, explain whether the change you see is significant. Explain what statistics you used. _Answers will vary._

12. Compare these data with the Baltimore urban stream data. In which place was the chloride level higher? _The chloride levels in Baltimore are higher._

13. Based on the graph you made only, predict what you think will happen to chloride in this stream next year. Explain your answer. _Answers will vary. Students may say that it depends on how much salt is added to the roads this winter; however this ignores the storage of chloride in the groundwater._