STEM Sims™

Unmanned Surface Vehicle

Unmanned SurfaceVehicle

Do you need an idea for a scientific study?
Try out one of our ideas or make one of your own.

Start learning right now about how unmanned surface vehicles are used by port security personnel to monitor harbor waters to make sure that the waterways remain pollutant-free. Take the following brief quiz to see how much you already know about water quality. See the bottom of page 4 to check your answers.

1. In the United States, about what percent of rivers are described as being unsafe for human recreation due to toxic water pollution?
   a. 10%
   b. 30%
   c. 40%
   d. 60%

2. Heat is considered a water pollutant.
   a. true
   b. false

3. Approximately how many gallons of oil were spilled in the Gulf of Mexico during 2010?
   a. 180,000
   b. 1,800,000
   c. 18,000,000
   d. 180,000,000

4. Most American cruise ships dump their garbage and untreated human waste into the ocean once they reach the 3-mile limit from shore.
   a. true
   b. false

5. A 36-foot long sailboat has an on-board toilet, called a head. Most U.S. ports allow the dumping of the head's waste directly into their waterways.
   a. true
   b. false

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A Stinky Choice!

In July of 2011, a fire at a sewage treatment plant in New York City caused the plant to be shut down. The operators of the plant were left with a most difficult dilemma; should they order the citizens of Manhattan to not flush their toilets or should the plant managers dump the raw sewage directly into the Hudson River and New York harbor? Check the box of which you would have chosen.

☐ Release the raw sewage into the Hudson River
☐ Order the citizens of Manhattan to not flush their toilets

Faced with such a difficult choice, the plant managers decided that people had to use the bathroom, so they opened the gates and released untreated sewage straight into the river. This dumping of raw sewage into the river continued for many days until the sewage treatment plant could be brought back up online.

During that time, scientists were busy studying the damage caused by the toxic waste and the "plume pattern" produced when the sewage entered the river system. The figures below show an outline of the New York City area and surrounding waterways. The site of the sewage release is marked, "Spill Site." The red dots indicate raw sewage. Which plume pattern, a, b, c, or d, do you think shows where the bulk of the sewage was three days after the spill? Look at the bottom of page 4 to check your answer.

a.

b.

c.

d.
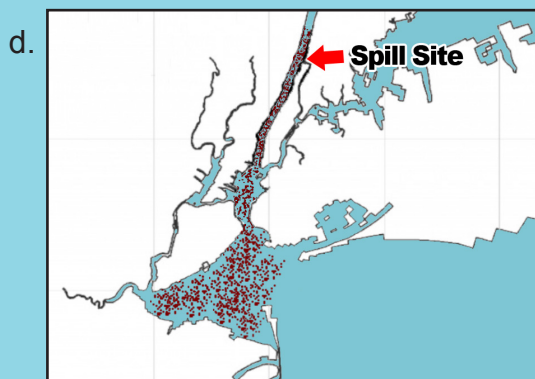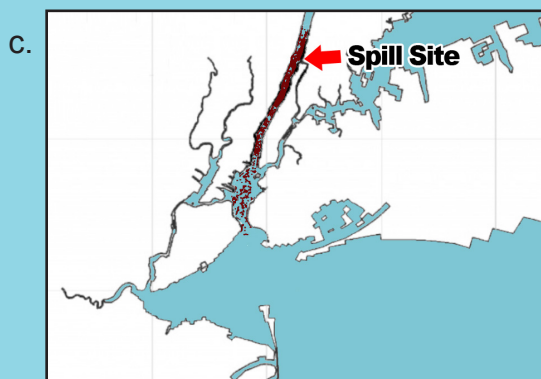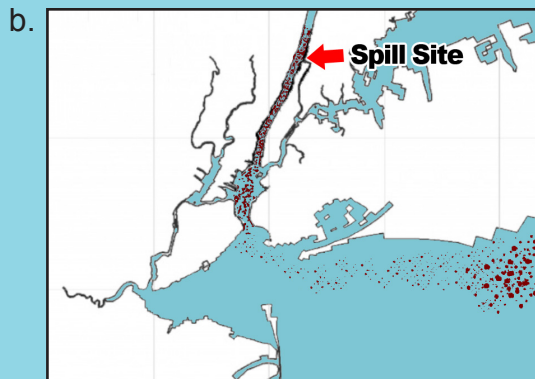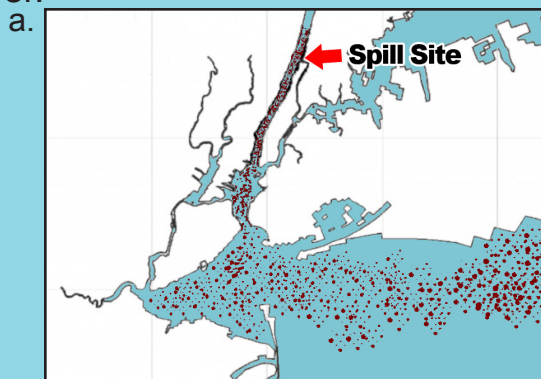
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Making Models

When city officials are faced with difficult decisions, one of the tools they need to have at their disposal is a model or simulation that presents different outcomes for given scenarios. The New York City sewage treatment plant managers and environmental planners had such a tool in the form of a model developed by the Stevens Institute Department of Homeland Security Center of Excellence. The model was used to predict plume dispersion, waste residence time, and other factors that impacted how dangerous the spill would be after a given time in a specific area.

For more on the model and its development, check out the following website: **http://seaandskyny.com/2011/07/22/where-is-the-sewage-spill-plume-going/**