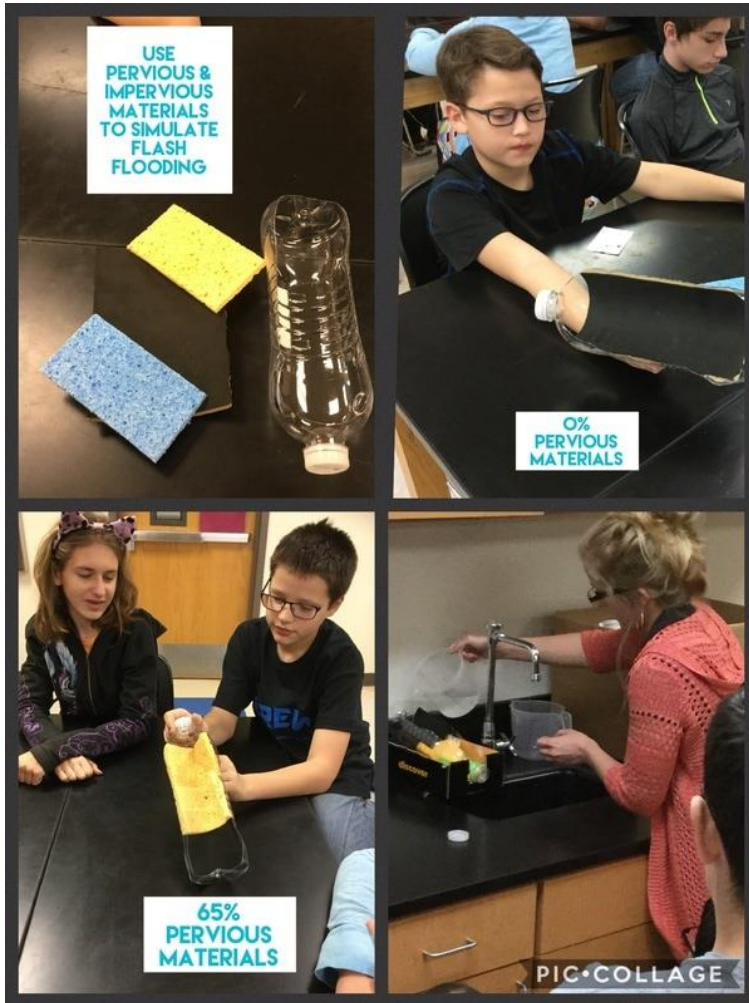


Flood Awareness

**Bandera County River Authority and
Groundwater District**

Morgen Ayers
*Water Conservation and Community Outreach
Coordinator*



Flood Awareness:

Turn Around Don't Drown[®]

<http://tadd.weather.gov/>

The **FLASH** in Flash Flooding

Sudden (or *in a flash*); little to no warning

Excessive amount of rainfall over a *short period of time*

The **FLASH** in Flash Flooding

“Flash floods are the most dangerous kind of floods, because they combine the destructive power of a flood with **incredible speed** and unpredictability.

<http://www.nssl.noaa.gov/education/svrwx101/floods/>

“Texas is home to "Flash Flood Alley," an area that extends from Del Rio to San Antonio to Austin to Dallas and is prone to rapidly occurring flood events due to its **unique topography** and the periodic occurrence of significant, **heavy rainfall.**” <http://www.twdb.texas.gov/flood/prep/>

The *FLASH* in Flash Flooding

the speed of floodwaters is influenced by:

- Rainfall intensity (excessive amount of rainfall over short time period)
- Topography (changes in elevation)
- Surfaces types that rainfall lands on
 - Pervious surfaces
 - Impervious surfaces

Surface Types: *Definitions and Examples*

- **Pervious/Permeable-** Permitting the passage of substances (like water)
 - Examples include:
 - Natural ecosystems with vegetation (trees, shrubs, and grassland) rooted in soil
 - Ex: uplands and riparian areas
 - Green areas
 - Yards, parks, highway medians, some sport fields
- **Impervious/Impermeable-** NOT Permitting the passage of substances (like water)
 - Examples include:
 - pavement in parking lots and on highways
 - Rooftops on buildings and homes

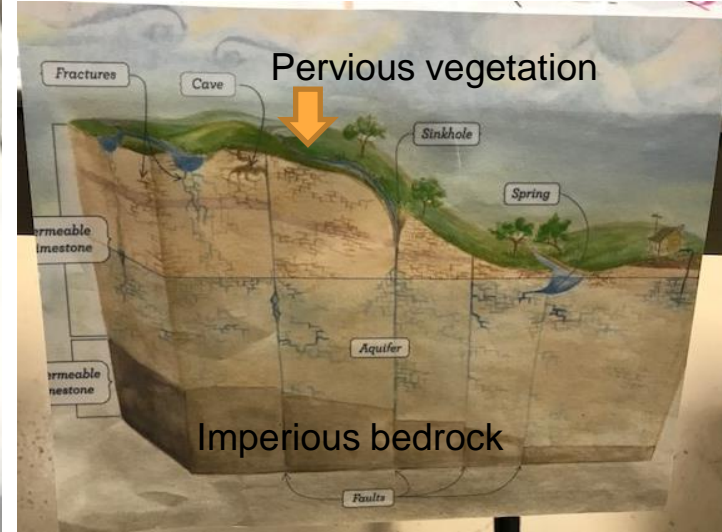
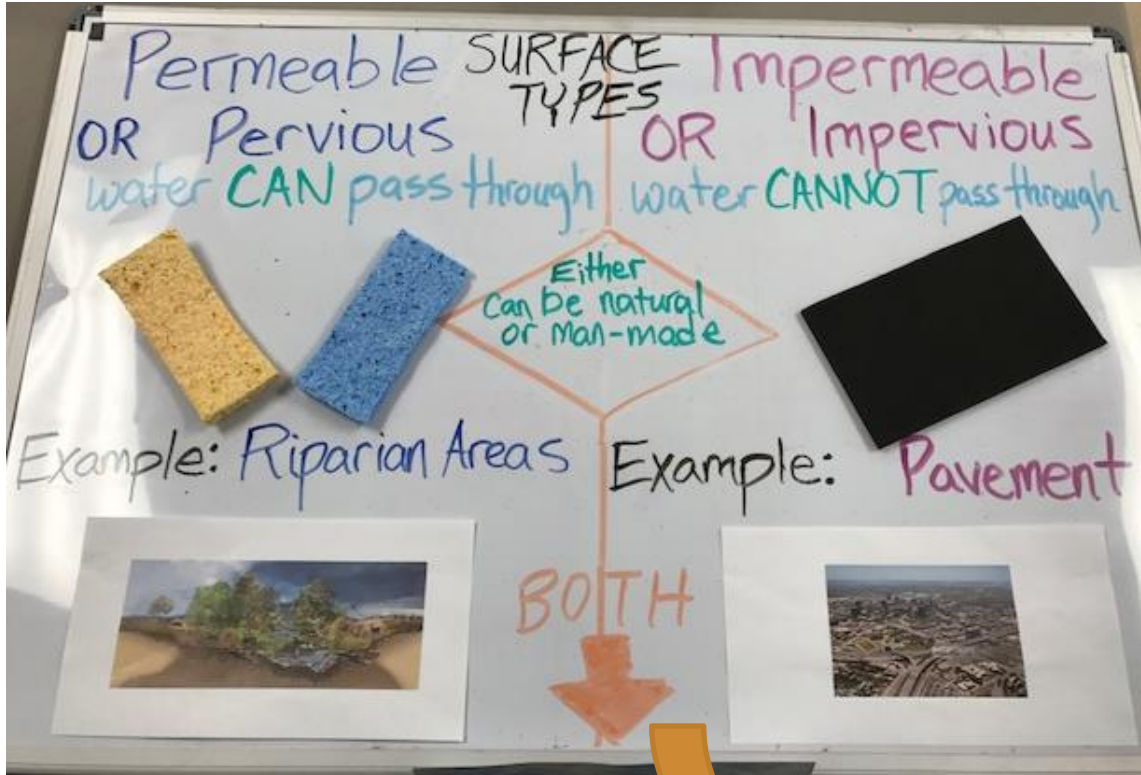
Assessing Floodwater Impacts on Pervious v. Impervious surfaces

The goal of the activity is to observe the **quantity of water** stored by the different basins types, (which are based on percentage of pervious materials), in order to emphasize the importance of these surfaces in mitigating floodwaters.

Activity Type:	Hands-on build
General Purpose:	Flood Awareness, Water storage/conservation
Specific Goal:	The goal of the activity is to observe the quantity of water stored by the different basins based on percentage of pervious materials in order to emphasize the importance of these surfaces in mitigating floodwaters.
Recommended Grade Level:	6th-7th
Arrangement:	groups of 2-4 students; activity time can range from 25 minutes to 1-hr (see breakdown on next slide)
List of Materials (see photos included)	<ul style="list-style-type: none">A. Base (of your choosing) to hold 2-liter bottle (one per group/table)B. 2-Liter bottles cut in half (# depends on activity length)C. Foam sheets (representing impervious surfaces)D. Standard kitchen sponge (representing pervious/permeable surfaces)E. 1000 mL Plastic kitchen measuring cups (2)

<p>Materials breakdown for a <i>25 minute</i> activity</p>	<ul style="list-style-type: none"> ● Base (1 per group/table) ● 2-Liter bottle cut in half (1 per group/table) ● Standard kitchen sponge (6.3” x 3.4” x 0.9”) cut in various sizes to fit basins in appropriate percentages (see pwpt before cutting) <ul style="list-style-type: none"> ○ 0%, 25%, 50%, 100% ● 6mm thick Foam sheets, 9”x12” (3 or 4 divided between all students) <ul style="list-style-type: none"> ○ cut in various sizes to fit basins in appropriate percentages <ul style="list-style-type: none"> ■ 100%, 75%, 50%, 0% <p><u>Assign each group/table one basin type.</u> Basin types for this activity are dictated by percentage of pervious cover- 0%, 25%, 50% and 100%. Provide a variety of sizes of foam sheets and sponges at each table in order to let the students properly select the materials to set up <u>one</u> assigned basin type.</p>
<p>Materials breakdown for a <i>45 minute to 1 hr</i> activity (per group):</p>	<ul style="list-style-type: none"> ● Base (1 per group/table) ● 2-Liter bottle cut in half (1 per group/table) ● Standard kitchen sponge (6.3” x 3.4” x 0.9”) cut in various sizes to fit basins in appropriate percentages (see pwpt before cutting) <ul style="list-style-type: none"> ○ 0%, 25%, 50%, 100% ● 6mm thick Foam sheets, 9”x12” (3 or 4 per group/table) <ul style="list-style-type: none"> ○ cut in various sizes to fit basins in appropriate percentages <ul style="list-style-type: none"> ■ 100%, 75%, 50%, 0% <p><u>Assign each group/table ALL basin types.</u> Provide all materials for each basin to every group/table.</p>

Suggested Display on whiteboard

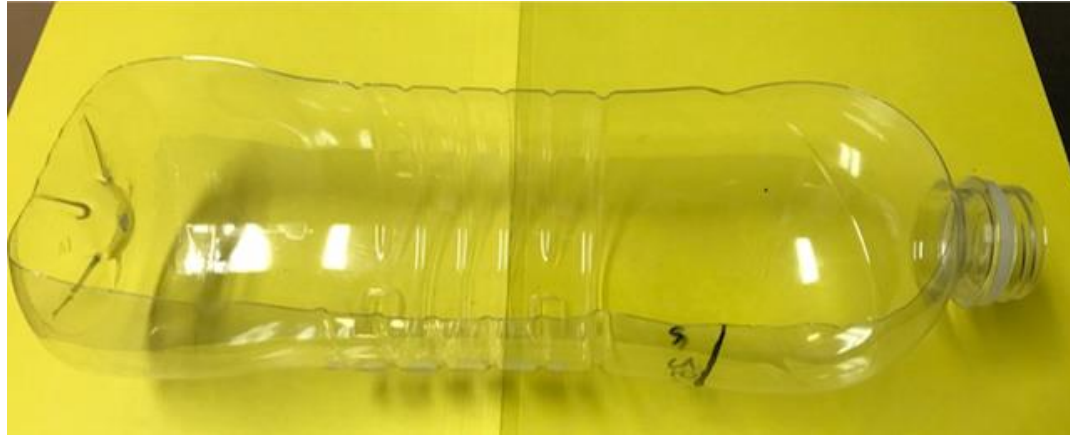


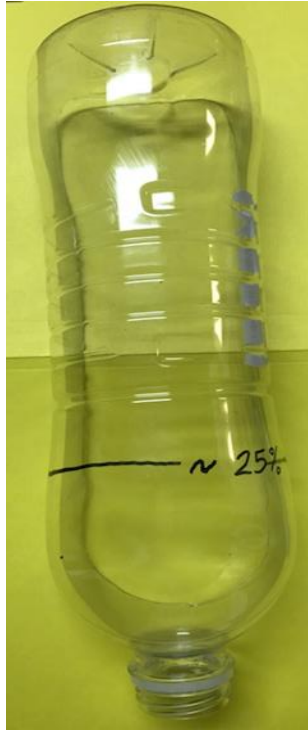
**Using the next 7 slides, construct your
basin or basins**

A. Base (of your choosing) cut to hold 2-liter bottle at a slope



B. 2-Liter bottles cut in half





B. 2-Liter bottles
flipped upside down to
indicate percentage
pervious cover

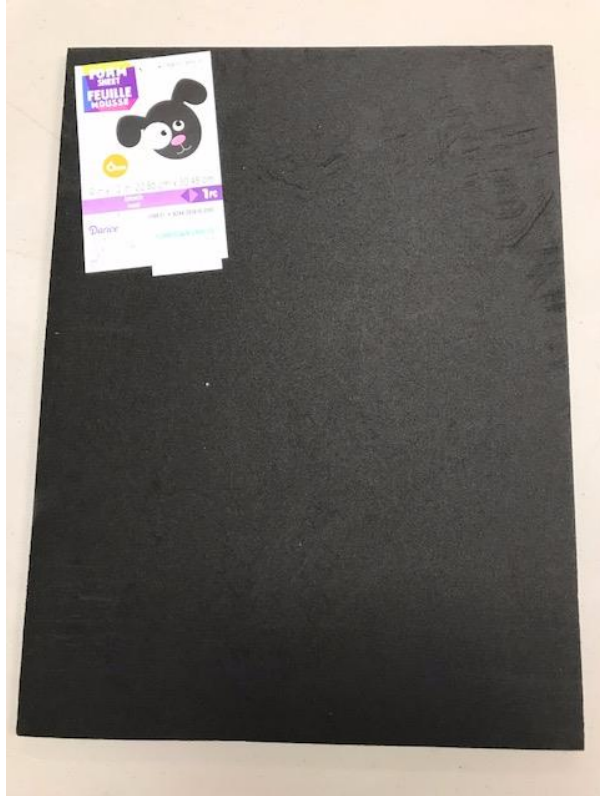
C. Foam sheets (representing impervious surfaces)

Cut up in various sizes to be used for 25%, 50%, and 100% impervious surface cover



C. Foam sheets (representing impervious surfaces)

Note: after cut to appropriate size, *bend foam to fit along with the basin curve to fit its entirety as shown in photo to the right*



D. Standard kitchen sponge

(representing pervious/permeable surfaces);

Note: *stack two sponges inside basin (one on top of the other) in*

order to better represent nature (root depth);

also, only trim the width of sponge (as shown in middle photo)

b/c the longest measurement fits well bent along with the basin

curve to fit its entirety

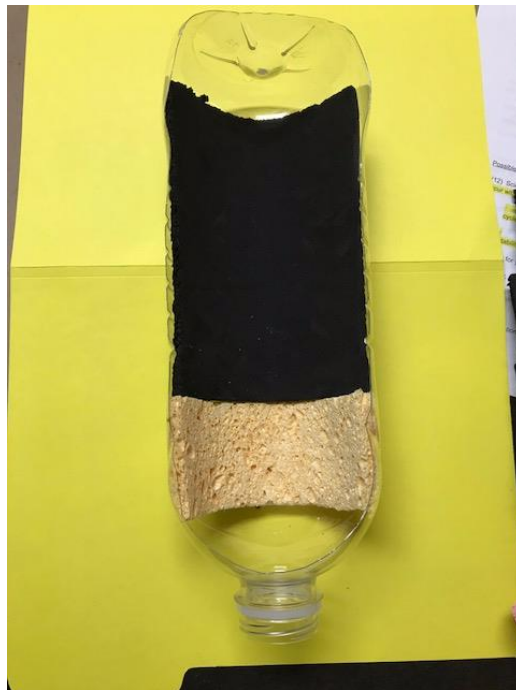
(as shown in middle and bottom right photo)



2-Liter bottles with basins, dictated by percentage pervious surface (sponges); *impervious surface* (foam sheets) shown also



0% pervious,
100% impervious

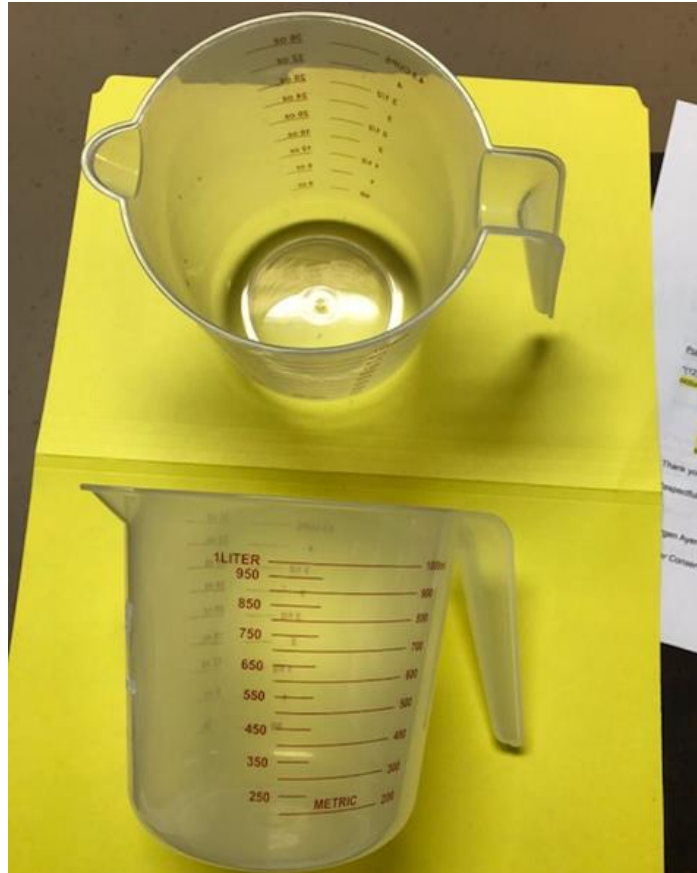


25% pervious,
75% impervious



50% pervious,
50% impervious

E. 1000 mL Plastic kitchen measuring cups (2)



**Using the next slide, apply water to
your basin or basins**

Holding one plastic measuring cup beneath the basin, Pour 500mL of water from the other measuring cup onto each basin type (with the same method and speed); record in a table the results, which will reflect the amount of water stored by the pervious surfaces



**0% pervious,
100% impervious**



**25% pervious,
75% impervious**



**50% pervious,
50% impervious**

Example of a table to record results

Note: Results are approximate and vary depending on method and speed of pouring water (be consistent); for example I took 5 seconds to pour the 500mL onto each basin and moved from left to right, making multiple passes as I poured. It is recommended to test full activity on your own prior to administering to class

% Pervious Surface	mL of Water in collection cup catching at bottom of base	mL of water stored by pervious surface
0	500	0
25	400	100
50	300	200
100	?	?