

Stormy's Guide To Storm Water





Hi, I'm Stormy!

Ever wonder where the rain



goes when it storms?



In Charlotte, water that comes from our sinks,



bathtubs,

and washing machines



is carried through pipes to the



wastewater treatment plant.

The dirty water at

the plant is cleaned through a complex system.

But water that

washes over streets,



lawns,



and parking lots

when it rains flows directly to creeks, ponds, lakes



and rivers. Storm water can pollute  our streams

because it is never cleaned  and picks up everything

in its path. Storm water can carry things like soil, yard waste,

 litter, animal waste,  used oil and fertilizers.

Tons and tons  of litter pollutes Charlotte's creeks.

Trash that's tossed out car windows,  has fallen out of

trucks,  or dropped on the ground all ends up in our

creeks. Remember to recycle  or throw it in the

trashcan.  Keep our creeks clean!



The Water Cycle

Condensation

The process where water moves from a gas to a liquid.

Precipitation

Another name for rain, sleet, snow, etc.

Evaporation

The process where water moves from a liquid to a gas.



Did You Know?

More than 2,000 miles of streams flow through Charlotte neighborhoods, parks, and business areas. That's about the same distance between Charlotte and Los Angeles, CA!

Collection

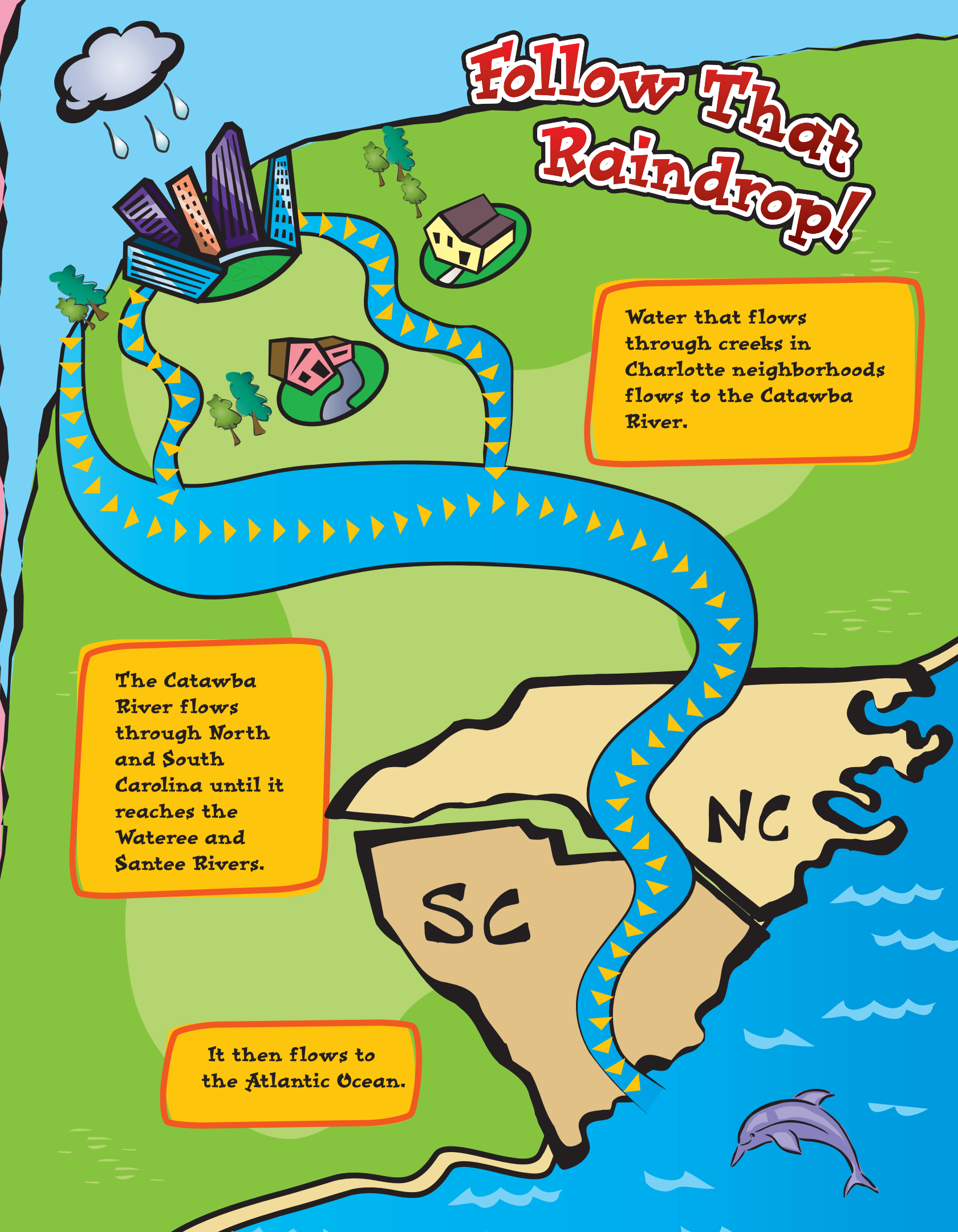
Where water drops accumulate together.

Follow That Raindrop!

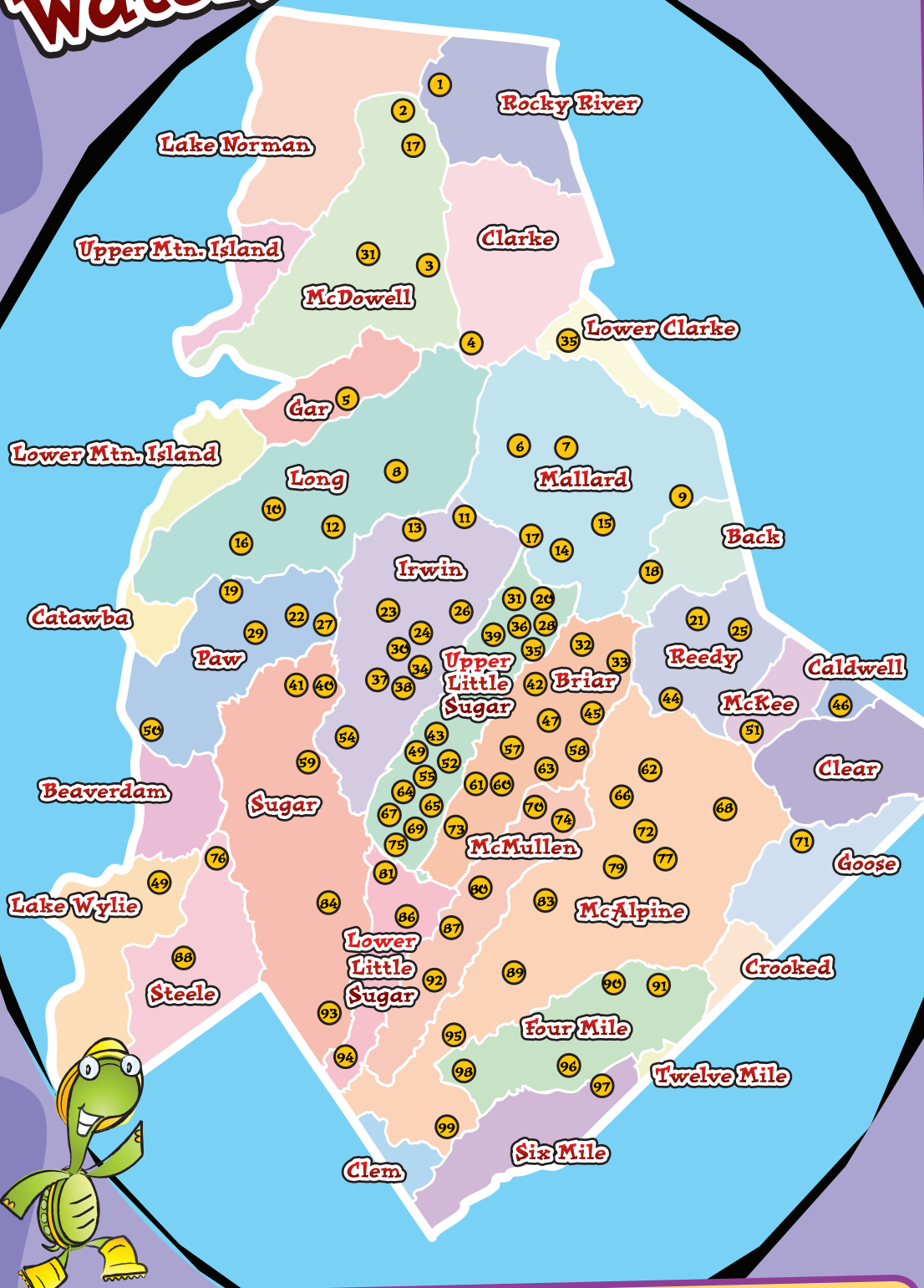
Water that flows through creeks in Charlotte neighborhoods flows to the Catawba River.

The Catawba River flows through North and South Carolina until it reaches the Wateree and Santee Rivers.

It then flows to the Atlantic Ocean.



What's My Watershed Address?

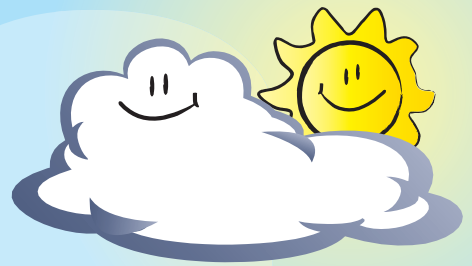


1. Davidson Elem.
2. Cornelius Elem.
3. Huntersville Elem.
4. Blythe Elem.
5. Long Creek Elem.
6. David Cox Rd Elem.
7. Mallard Creek Elem.
8. Hornets Nest Elem.
9. University Meadows Elem.
10. Mountain Island Elem.
11. Winding Springs Elem.
12. Oakdale Elem.
13. Statesville Rd Elem.
14. Nathaniel Alexander Elem.
15. Morehead Elem.
16. Paw Creek Elem.
17. J.V. Washam Elem.
18. Newell Elem.
19. Pawtuckett Elem.
20. Hidden Valley Elem.
21. Joseph W. Grier Academy
22. Allenbrook Elem.
23. University Park Elem.
24. Lincoln Heights Elem.
25. Reedy Creek Elem.
26. Druid Hills Elem.
27. Thomasboro Elem.
28. Highland Renaissance Acad.
29. Tuckaseegee Elem.
30. Oaklawn Elem.
31. Torrence Creek Elem.
32. Briarwood Elem.
33. Devonshire Elem.
34. Walter G Byers Elem.
35. Highland Creek Elem.
36. Highland Mill Montessori
37. Bruns Av Elem.
38. Irwin Av Elem.
39. Villa Heights Elem.
40. Ashley Park Elem.
41. Westerly Hills Elem.
42. Shamrock Gardens Elem.
43. First Ward Elem.
44. Hickory Grove Elem.
45. Windsor Park Elem.
46. Clear Creek Elem.
47. Merry Oaks Elem.
49. Winget Park Elem.
50. Berryhill Elem.
51. JH Gunn Elem.
52. Elizabeth Traditional Elem.
54. Barringer Elem.
55. Dilworth Elem.
57. Chantilly Elem.
58. Winterfield Elem.
59. Reid Park Elem.
60. Billingsville Elem.
61. Eastover Elem.
62. Albemarle Rd Elem.
63. Oakhurst Elem.
64. Sedgefield Elem.
65. Myers Park Traditional Elem.
66. Idlewild Elem.
67. Collinswood Elem.
68. Lebanon Rd Elem.
69. Park Rd Elem.
70. Cotswold Elem.
71. Bain Elem.
72. Piney Grove Elem.
73. Selwyn Elem.
74. Rama Rd Elem.
75. Pinewood Elem.
76. Steele Creek Elem.
77. Crown Point Elem.
79. Greenway Park Elem.
80. Sharon Elem.
81. Montclair Elem.
83. Lansdowne Elem.
84. Nations Ford Elem.
86. Huntingtowne Farms Elem.
87. Beverly Woods Elem.
88. Lake Wylie Elem.
89. Olde Providence Elem.
90. Elizabeth Ln Elem.
91. Matthews Elem.
92. Smithfield Elem.
93. Sterling Elem.
94. Pineville Elem.
95. McAlpine Elem.
96. Providence Spring Elem.
97. McKee Rd Elem.
98. Endhaven Ln Elem.
99. Hawk Ridge Elem.

Using the list to the right, find the school closest to where you live to find your watershed.

My watershed address is _____.

The Watershed



1) _____

2) _____

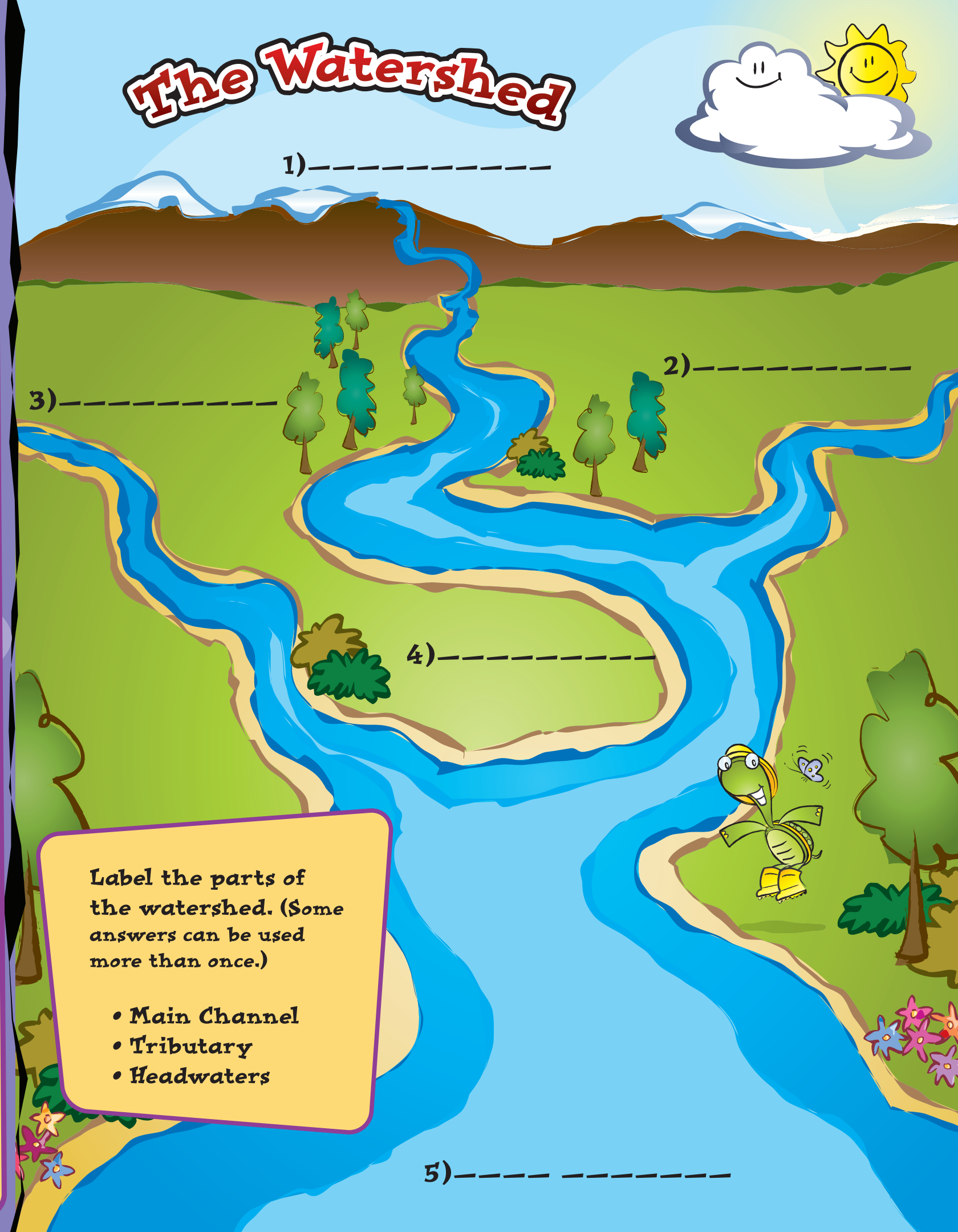
3) _____

4) _____

Label the parts of the watershed. (Some answers can be used more than once.)

- Main Channel
- Tributary
- Headwaters

5) _____



The

BIOTIC INDEX

Benthic macroinvertebrates are aquatic organisms that are used to determine the health of a stream.

Benthic = Bottom Dwelling

Macro = Large enough to be seen with the eye

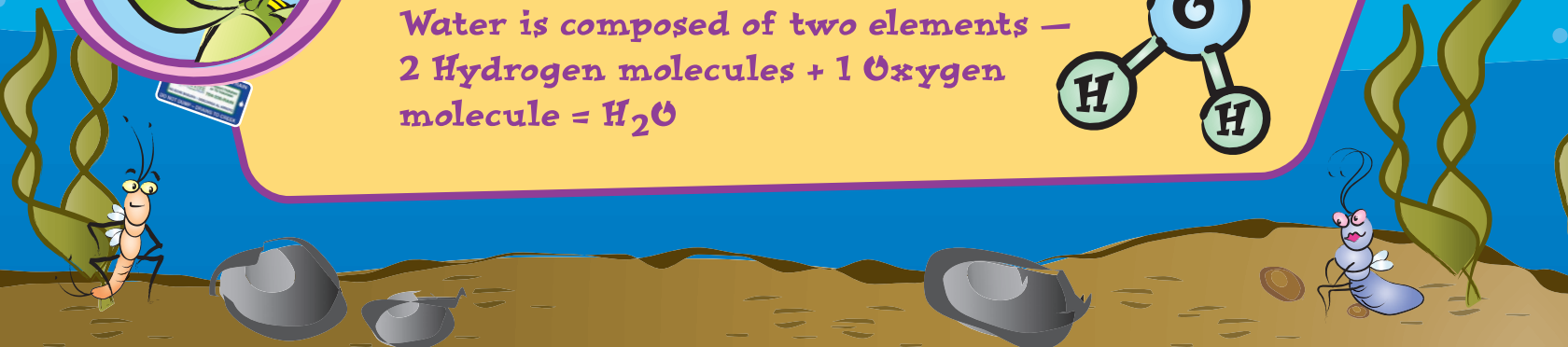
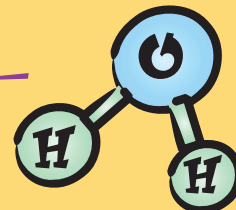
Invertebrate = Not having a backbone

We can tell how healthy a stream environment is by knowing how many and what kinds of benthic macroinvertebrates call the stream home. If a stream is clean and healthy, many different kinds of macroinvertebrates and lots of them will be in the stream.

Some kinds of macroinvertebrates are more sensitive to pollution than others and will die first. A few macroinvertebrates can tolerate some pollution and will last longer in a polluted stream.

Did You Know?

Water is composed of two elements —
2 Hydrogen molecules + 1 Oxygen
molecule = H_2O



YE OL' BIOTIC INDEX

CLASS 3



Salamander



Stonefly nymph



Mayfly nymph



Water Penny



Riffle Beetle



Caddisfly larva



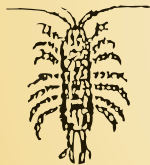
Fairy Shrimp



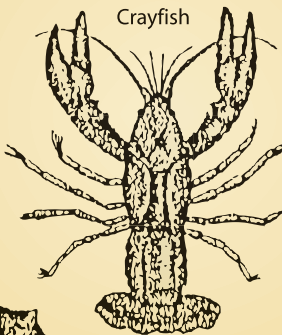
Fish & other vertebrates

CLASS 2

Aquatic Sowbug



Gill Snail



Crayfish



Dragonfly nymph



Damselfly nymph

Flatworm



Crane fly larva

CLASS 1



Tubifex worms



Lung Snail



Mosquito larva



Leech



Midgefly larva



Drone-fly larva

What's for Lunch?

(Content developed by the Audubon Naturalist Society)

Madame Mosquito is planning a party and she wants all her guests to feel right at home. To help, match the menu items with her friends.

Doris Dobsonfly, a pretty predator, always enjoys a healthy portion of fresh meat and leaves her vegetables for others. She likes to eat _____.

Stuart Stonefly loves to eat leftovers that have decayed a while in his refrigerator. He likes to eat _____.

Craig Caddisfly has a silken net he created to help secure his meals. He likes to eat _____.

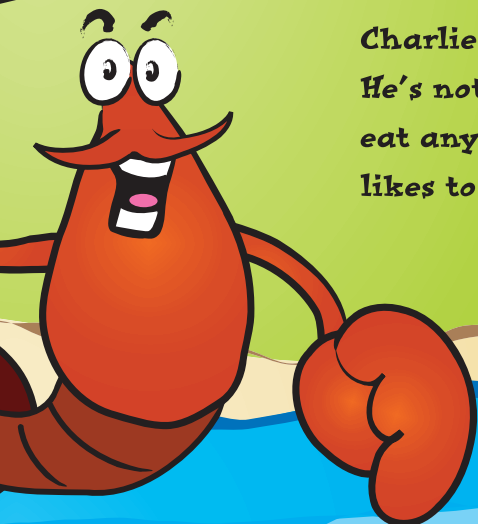




Walter Water-Penny, a flat-shaped scraper, munches on algae he scrapes from rocks and other materials. He likes to eat _____.



Dave Dragonfly is an impatient guest. He's a carnivore that can't wait for the meal to be served and starts eyeing up the other guests. He likes to eat _____.



Charlie Crayfish is a larger guest. He's not picky as an omnivore; he'll eat anything he can scavenge. He likes to eat _____.

Le Menu

Stream Soup: a savory dish from the bottom reaches, a clear broth with scrumptious suspended flavors

Stream Stir-fry: a blend of vegetable debris and day-old delicacies

Prey Pudding: get your fix with this mix of the freshest insects

Creek Casserole: a mix of anything from plants to insects

Guest Goulash: a quick-prepared meal of raw insect meat, ready in seconds

Algae Appetizer: a sampling of the finest algae scraped from the bottom of our local creek



Word Games!

Word Search

How many storm water words in the list to the right can you find in the water?

Y G A E A T L Q N Y M Z A O C M A O I V
H T W B F N I L T I R C L D C T U Y H W
B A S I N E Y I I F O D H R N T Q Z H P
K M Q K T M T I V P T V E E F A T R U C
M D B F K N H Y B U S Z R A M I L N R L
P I H U A O F O O R I G L H G I R T P I
I T P U P R L J G L Z L N R B W C E E O
P C Q T Z I M S I Y T I L A U Q R A S W
E H S N M V H T I M P E R V I O U S L P
Z R Q I Y N R Z N G B K B D Y C Q R O S
Q K Z O S E S U S E N E E Z U W R L K U
E L E P F C I D P D A I H J M M L E F E
R E E N I G N E E M D K D B D U P F E E
O H R O I C O N C R E T E O T L O I T K
S R F N Q E W A T E R O U I O N A S N L
I E I I X R D E O G O O O I U L A W P G
O T D A A R T H R Q G N A R U W F N N U
N T F I A G J Q T Q N Q S Z V X I C X R
M U N I N E G V Q S G Y Y Z G V V V K O
L G N Y N F U I E G U A G J C E E B I T

BASIN
CHEMICALS
CONCRETE
CREEK
DITCH
DRAIN
DUMPING
ENGINEER
ENVIRONMENT
EROSION
FERTILIZER
FLOODING
GAUGE
GIS
GUTTER
IMPERVIOUS
INSPECTOR
LAWN
NONPOINT
OIL
OUTFALL
PIPE
POLLUTION
QUALITY
QUANTITY
RAIN
ROOF
RUNOFF
SPILL
STORM
WASTE
WATER
WETLAND





What can you

Volunteers are marking storm drains in neighborhoods all over Charlotte so that our citizens know that dumping anything down storm drains can harm our environment. **How many storm drain markers can you find in Stormy's Guide to Storm Water?**

Volunteer to mark storm drains!



Volunteer to mark the storm drains at your school or in your neighborhood.



do? Volunteer!!!

Want to keep our creeks clean? Your school can **Adopt-A-Stream**. Ask your teacher to contact 704-336-5500 to find out more information.



...never dump anything down a storm drain,



...participate in Big Sweep,



...adopt-a-stream,



...and don't litter!

RAIN IS ONLY FOR RAIN
Charlotte-Mecklenburg
STORM WATER Services
To Report Pollution or To Volunteer
704-336-RAIN
BASURA - DESCARGA AL ARROYO
DUMP - DRAINS TO CREEK



CROSSWORD PUZZLE!



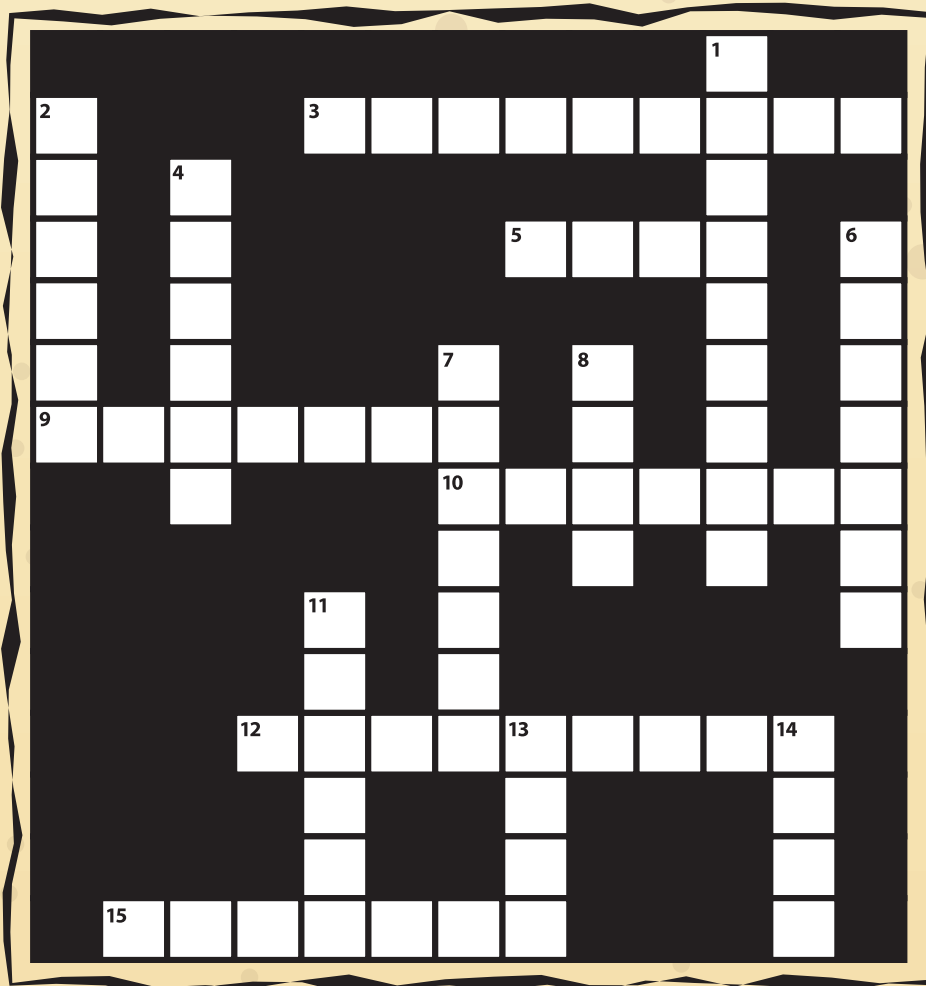
CROSSWORD CLUES

Down

1. Anything that gets in the path of a raindrop becomes storm water _____.
2. _____ and grass clippings are types of yard waste that can become storm water pollution.
4. Storm water flows to creeks, lakes, ponds, _____ and oceans.
6. When streams become polluted with oils, sediment and trash, fish and other _____ organisms will die or leave.
7. Don't dump used oil or paint down storm drains. _____ it!
8. Storm drain markers say, "Do Not _____, Drains to Creek."
11. Storm _____ are only for rain.
13. Another name for storm water is _____.
14. Water flows _____ hill.

Across

3. Used oil is a type of household _____ waste.
5. _____ is another name for sediment.
9. Storm water flows through the drainage system to our _____ waters.
10. Yard waste can be recycled or you can _____ it.
12. A _____ is an area of land that drains to a specific body of water.
15. _____ occurs when bare soil is exposed to rain.



TRUE/FALSE



Storm water flows to a wastewater treatment plant. T / F



Water that goes down the kitchen sink is treated. T / F



Another name for storm water is rain. T / F



There are more than 85,000 storm drains in Charlotte. T / F



Impervious surfaces allow water to soak into the ground. T / F



There is nothing people can do to keep creeks clean of pollution. T / F



Animal waste is a non-point source pollutant. T / F

Watery Maze!

Help Stormy get to the trash in the creek before it flows downstream to the ocean.



Glossary:

Aquatic - living or growing in or on the water

Benthic macroinvertebrate - a bottom-dwelling aquatic organism that has no backbone and is large enough to be seen with the naked eye

Blockage - an obstruction to the flow of water

Compost - organic matter produced by the breakdown of natural items such as food scraps, grass clippings and leaves

Detention - to temporarily hold water before being slowly released

Environment - the natural world of living organisms

Erosion - the wearing away and transportation of the Earth's surface by running water, wind, ice or other geological agents

Fertilizer - nutrients applied to plants to help them grow

Habitat - place where an organism grows or lives

Household hazardous waste - chemicals that are corrosive, ignitable, toxic or reactive that present a threat or unreasonable risk to people or the environment and can no longer be used

Impervious - areas that do not allow water to soak into the ground like roofs, streets, sidewalks and parking lots (Antonym — Pervious)

Litter - items that have been discarded improperly

Monitor - to observe a system for changes and keep records of the data collected

Non-point source - pollution that cannot be traced to a single point, because it comes from many individual places or a widespread area

Runoff - the portion of rainfall or water from lawn sprinklers that flows across the land's surface, does not soak into the ground and eventually runs into a larger body of water

Sediment - soil

Storm drainage system - the collection of pipes, ditches, culverts and creeks that allow water to drain to larger bodies of water during a storm

Storm water - rain

Surface water - water that flows or is stored above the land (examples include: ponds, lakes, rivers and oceans)

Water cycle - the continuous journey a water drop makes over time; also known as the hydrologic cycle

Water pollution - any human-caused contamination of water that reduces its usefulness to humans and other organisms

Water quality - the condition of our surface waters as it relates to a healthy environment

Watershed - the total land area that drains runoff to a particular body of water

Yard waste - natural debris that is no longer wanted (examples include: leaves, grass clippings and branches)

Bye!



Visit Stormy on the web!

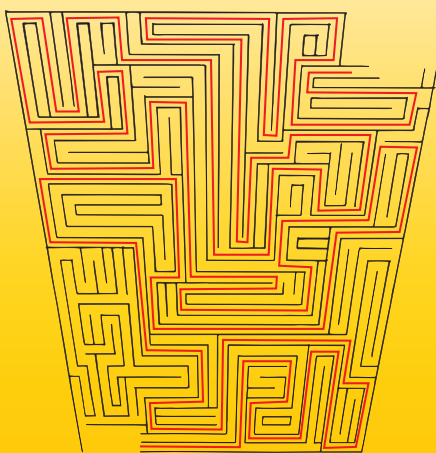
stormy.charmeck.org

For more information:

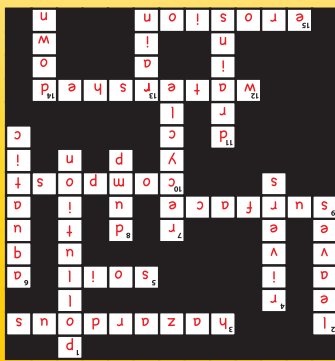
call 704-336-2291

or write to:

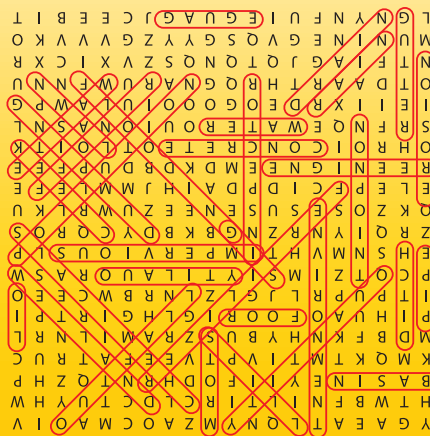
Charlotte-Mecklenburg Storm Water Services
600 E. Fourth St, 14th Floor
Charlotte, NC 28202.



MAZE:



CROSSWORD PUZZLE:



WORD SEARCH:

- PARTS OF THE WATERSHED:**
- 1) Headwaters
 - 2) Tributary
 - 3) Tributary
 - 4) Tributary
 - 5) Main Channel

HIDDEN MESSAGE:
ONLY BAIN GOES
DOWN THE STORM
DRAIN

- WHAT'S FOR LUNCH?**
- Doris Dobsonfly – Prey Pudding
 - Craig Caddisfly – Stream Soup
 - Stuart Stonefly – Stream Stir-fry
 - Water Penny – Algae Appetizer
 - Dave Dragonfly – Guest Goulash
 - Charlie Crayfish – Creek Casserole

STORM DRAIN MARKER TOTAL: 46

- WORD SCRAMBLE:**
- alke – lake
 - dwtshreae – watershed
 - nchnae – channel
 - ndart – drain
 - tylqai – quality
 - odfol – flood
 - sbant – basin
 - mntverienon – environment
 - snioroe – erosion
 - twrae – water
 - mrtso – storm
 - oltpnlui – pollution
 - ekcer – creek
 - dorp – pond

SECRET PHRASE: Prevent water pollution.

Answers:

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