

## Lesson: Follow the Footprints

\*Arlington Echo works to continuously improve our lessons. This lesson may be modified over the course of the school year.

**Environmental Literacy Question:** How have humans affected the Chesapeake Bay and its watershed?

**Topic/Essential Question:** How is the earth's climate changing?

**Unit/Lesson Sequence:** This is one of two lessons in the "Our Impact" module based at Arlington Echo.



### Content Standards:

#### Environmental Literacy Quarter 3

3.B.1.d. Explain and diagram how greenhouse gasses increase thermal energy in the atmosphere and its effect on earth's temperature and systems.

6.A.1. Identify and describe natural changes in the environment that may affect the health of human populations and individuals.

#### Science

3.4.F.1.a. Identify and describe the interactions of organisms present in a habitat.

6.4.B.1. Recognize and describe that people in Maryland depend on, change, and are affected by the environment.

#### Common Core Standards for English Language Arts Standards- Speaking and Listening-4<sup>th</sup> Grade

##### Comprehension and Collaboration

- CCSS.ELA-Literacy.SL.4.1 Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on *grade 4 topics and texts*, building on others' ideas and expressing their own clearly.

**Length of lesson:** 35 minutes

### Student Outcomes:

- Students will be able to use background knowledge of climate change and environmental impacts of human actions to participate in the ecological footprint challenge course.
- Students will investigate how they can reduce their ecological footprint.

### Knowledge of the Learner:

- Prerequisite knowledge, skills and processes: Students should view the EPA movie on climate change to gain an understanding of the causes of excess carbon in the carbon cycle and the effects of too much carbon in the atmosphere on climate change. Students should also have an understanding of the carbon cycle and human impacts on the environment.
- Student needs, interests, previous learning: These will be identified in the pre-assessment.
- Conceptual difficulties: Understanding that our everyday choices impact the environment.
- Differentiation: This lesson will appeal to different types of learners. The auditory learner will do well hearing the facts at each challenge. The visual learner will do well seeing the real-life examples of ecological footprint reduction strategies at each station. The kinesthetic learners

will do well moving through the challenges.

**Knowledge of Content:**

• **Vocabulary:**

Ecological footprint	Conservation	Deciduous Trees
Steward	Natural resources	

• **Resources:**

Clue, Challenge, and Score Cards	Sort it Out items	Soil
Footprint Poster	Potmakers	Newspaper scraps
Stopwatch (or phone stopwatch)	Acorns	Clothes and clothespins
Roadblock transportation model	Fill the Barrel drops	Charade cards
Classifications Poster	Board to draw on	Paint/coloring materials

• **Supplements:**

A: Footprint Poster  
B: Challenge Score Card  
C: Challenges  
D: Map  
E: Conservation Point Classifications  
F: Vocabulary

**Instructional Delivery**

**Lesson setup:**

Arlington Echo staff will help you set up during your training. Materials will be kept in the Boat House. The ecological footprint poster, clue card 1, board with paint/coloring materials, and conservation point classification sheet should stay at the lesson’s meeting station (either the picnic table by the Boat House or West Cabin). Challenge materials and clue cards will be distributed to the various stations as a staff person goes through training with you.

**Pre-Assessment:**

During the introduction to the “Our Impact” module, Arlington Echo staff will invite students to share what they know about human impacts on the environment.

**Motivation/Warm-Up:**

1. Meet students at the picnic tables by the Boat House (or in West Cabin during cold or inclement weather).
2. Introduce yourself and welcome students to the ‘Follow the Footprints’ challenge!
3. Show students the “How big is YOUR footprint?” poster and explain that just like we leave behind footprints when we walk on sand at the beach, we also leave behind an “ecological footprint” on the Earth based on the resources we use and the waste we create.
4. Briefly discuss the resources we use and the types of waste or pollution we create that make up our ecological footprint (**Supplement A**).

5. Ask students “do you think the average American has a small or large ecological footprint compared to the rest of the world?”
  - a. *Large, according to the Global Footprint Network, the U.S. has the third largest footprint per person, and the second largest footprint per country.*
6. Have students guess how many Earths worth of space and resources we would need if everyone in the world (about 7 billion people) had as large of an ecological footprint as the average American?
  - a. *About 4...that’s not sustainable!*
7. Ask students “why is it important to keep your ecological footprint small and conserve (*use less of, save*) resources?”
  - a. *Because there is a limited amount of resources*
  - b. *So there are enough resources for other people, living things, and future generations*
  - c. *Because we only have one Earth*

**Follow the Footprints challenges:**

We will work as a team and “follow the footprints” through a series of challenges that reduce our ecological footprint. Depending on how well the group completes the challenges, they will earn “conservation points”. At the end of the day the group(s) who conserved the most (and earned the most points) based on the challenges will be announced at the closing!

1. Read the first clue, then “Follow the footprints” to the first challenge! **(Supplement D)**.
2. At each stop, ask if the kids can guess what their challenge is, based on the clue. Explain anything they didn’t figure out (i.e. time constraints, how the points work, etc.).
3. After completing each challenge and before you travel to the next challenge, read the rhyming clue and see if the kids can figure out what their next challenge will be.
4. “Follow the footprints” (footprint markings) to the next challenge around the loop **(Supplement D)**.
5. As you travel with the group, keep score of points using the scorecard **(Supplement B)** and the descriptions of challenges and challenge scoring **(Supplement C)**.

*\*Don’t forget about the bonus points available at certain challenges and the ROADBLOCK (as indicated in Supplements B and C)—bonus questions should be posed to students after completing the specific challenge*
6. Once you complete the loop and return to the picnic tables by the boat house, have students add up their group’s points to find their total score.

**Assessment:**

Once students total their conservation points, read their classification **(Supplement E)**. Remind students that, regardless of how few or many points they earned, there is always room to improve. At the end of each classification description, there is a question in italics asking students how they can reduce their ecological footprint.

Invite students to use the paint and/or coloring utensils to write or draw one step they will take to reduce their ecological footprint and/or educate and inspire others to do the same on the board provided (the answer to the question at the end of the classifications).

Follow-up/discussion question:

- *What other strategies could we use to reduce our footprint besides the ones we learned in our*

*challenges?*

- Carpool, use public transportation, bike, or walk when possible
- Eat and shop sustainably
- Reduce electricity use at home
- Enjoy the outdoors whenever possible 😊

**Notes for Clean up:**

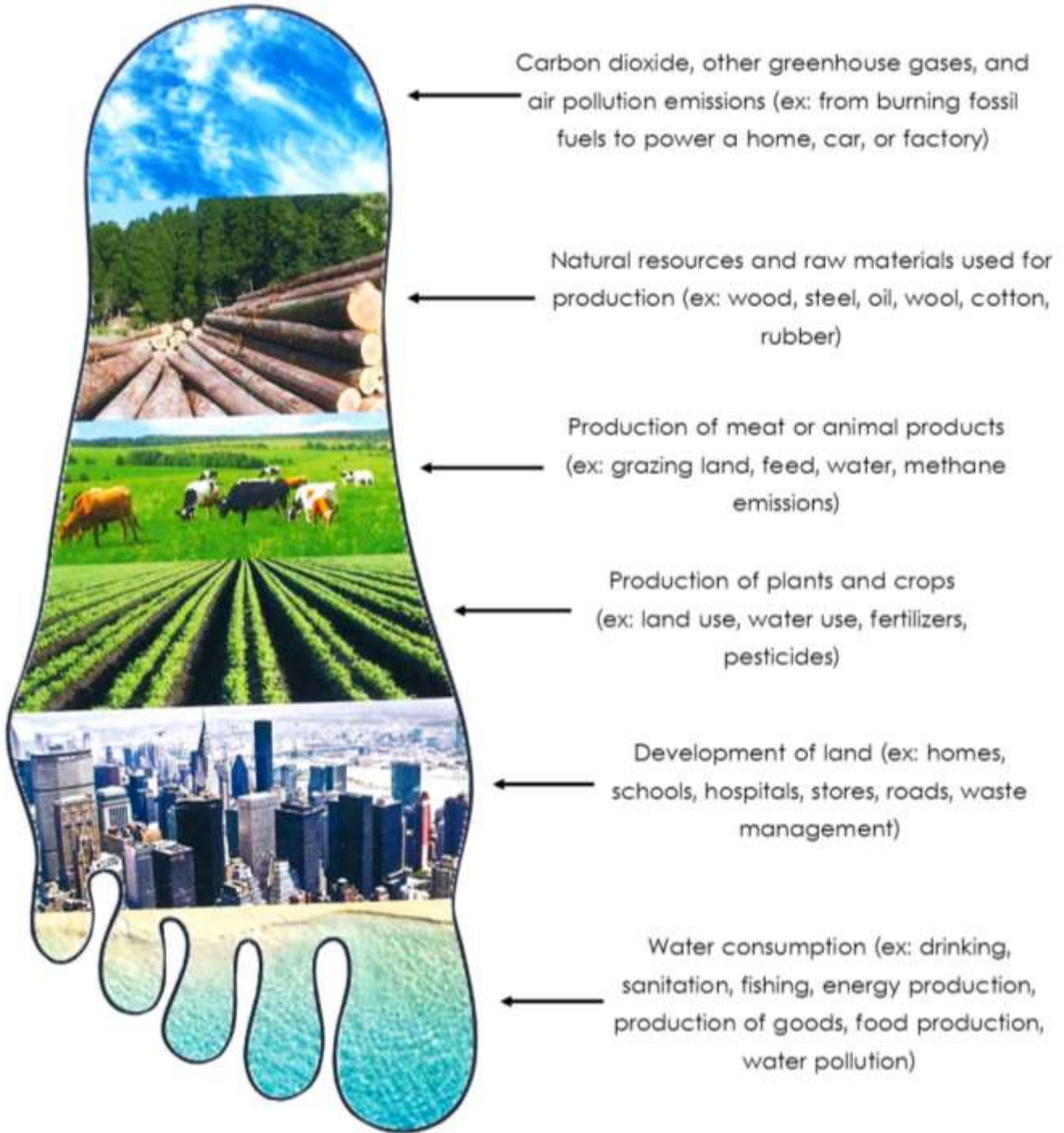
Please clean, organize and return the lesson materials to their proper locations at the end of each day of instruction. Remember to inform the Arlington Echo staff if you need assistance or if any materials are damaged or missing. The potted acorns should stay in the Main Pavilion, we will send them on the bus with your students so they can take them home. **Please tell an Arlington Echo staff member which group earned the most points!**

**Notes for Inclement Weather:**

Arlington Echo encourages keeping our outdoor activities outdoors—even in the rain—but in the case of severe weather (thunder/lightning extreme cold, etc.), the rain location for this activity will be inside West Cabin. An alternate activity will be given to the instructor in case of inclement weather.

Supplement A: Footprint Poster with Explanations

# How big is YOUR footprint?



**Supplement B: Follow the Footprints Challenge Score Card**

<b>Group #:</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>
Sort it Out						
Plant a Tree						
Clothesline Relay						
ROADBLOCK						
Fill the Barrel						
<b>Total # Conservation Points:</b>						

**SCORING:**

<b>Sort it Out</b> 1 point for each item sorted correctly Maximum: 20	<b>Plant a Tree</b> Everyone plants a tree = 20 points Possible Bonus: 5	<b>Clothesline Relay (timed)</b> < 1:30 min. = 20 points 1:30-2:30 min. = 10 > 2:30 min. = 5 Possible Bonus: 5	<b>Fill the Barrel</b> Full barrel = 20 points 3/4 barrel = 15 1/2 barrel = 10 1/4 barrel = 5
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**BONUS!!**

**Plant a Tree:**

5 Points if the group can correctly guess **why** planting a deciduous tree near your house saves energy in the winter *and* summer

**Clothesline:**

5 Points if the group can explain **why** using a clothesline reduces your footprint

**ROADBLOCK:**

10 Points if the group can correctly order the 4 forms of transportation from greatest to smallest distance traveled per 1 pound of carbon emitted

**Maximum Possible Points: 100**

### Supplement C: Follow the Footprint Challenges

#### 1. Read by the Boat House before you head to the challenges

Just like walking on the sand  
We leave our footprints on Earth's land,  
In the sky and water too,  
Just by the things we choose to do.  
Working as a group today,  
We'll Follow the Footprints along the way!

#### 2. Sort it Out

Objective: Correctly sort objects into 4 categories—waste, recyclable, compostable, and reusable.

Location: Natural Playground (tree trunk circle)

Clue: (read BEFORE the challenge)

All the things we use each day  
Should we reuse, recycle, or just throw away?  
Look through the items and decide what to do  
When it's no longer useful to you.  
Choose the best disposal route  
And work as a team to Sort it Out!

Instructions:

Sort objects in the center pile into 4 categories: waste, recyclable, compostable, and reusable (located around the circle of tree stumps). Some objects may fit into more than 1 category, but in order to get credit students must sort items into the category that is best for the environment (i.e. reusable > recyclable, compostable > waste).

Scoring is based on the number of items they sort CORRECTLY in **one minute**. Anything students put into the "reusable" pile that aren't obvious (like a reusable bag or water bottle) the students must explain **how** they would use it in order to get credit (ex: they would use a plastic grocery bag to pick up pet waste or they would sew capri sun pouches into a lunch box).

After scoring, briefly go over any items the students sorted incorrectly. At the end of the challenge, ask students to put objects back in the pile at the center of the tree stump circle so they are ready for the next group.

Answer Key: (20 items total)

- Waste (5)—Tostitos chip bag (made of foil and plastic so it's not recyclable), Capri Sun, Styrofoam, popsicle stick, dried up marker
- Recyclable (6)—yogurt cup, coke zero bottle, blueberry container, plastic grocery bag, glass jar, toilet paper roll
- Compostable (5)—watermelon, grapes, orange, bread, carrot
- Reusable (4)—orange lunch box, cloth bag, blue water bottle, t-shirt

Hint:

Anything students put into the “reuse” pile that could reasonably be considered reusable is correct! (Kids **must** explain how they would reuse or repurpose the item unless obvious)

Scoring:

1 point for each item sorted correctly—maximum: 20

### 3. Plant a Tree

Objective: Every group member should make a newspaper pot and plant an acorn to take home and plant.

Location: Main Pavilion

Clue: (read BEFORE the challenge)

Wind in the willows, snow on the pine,  
These types of plants are mighty fine!  
They filter our air and water too  
And they save us energy—who knew?!  
So now it’s time to plant some trees--  
The deciduous kind that drop their leaves!

Instructions:

- Ask students what they already know about trees? (*They produce oxygen that we breathe, their roots filter water and prevent runoff, they provide habitat and food for animals, etc.*)
- Planting trees is one of best things we can do to reduce our ecological footprint! Not only are they important sources of habitat, food, and oxygen in the environment—they also save energy when we plant them near our windows. (**Bonus: WHY?**)
- Help students create pots made out of recycled newspaper strips (AE staff will demonstrate during training). Students should place soil in the pots, pat the soil firmly down, place the acorn (which grows into an oak tree!) in the pot, cover it with more soil and pat it down.
- When complete, place pots in the tray and let students know that we will send the trees back to school with them. They should take one home to plant in a good spot (the newspaper pot can be planted directly in the soil because newspaper decomposes).

BONUS:

The group will get an extra 5 points if they can explain *why* planting a deciduous tree near your windows saves energy in the summer **and** winter. (You may need to explain what a deciduous tree is)

Answer: *Deciduous trees shed their leaves in preparation for winter (unlike evergreens). So planting a deciduous tree near your window provides shade in the summertime and allows warm sunlight into your house in the wintertime (because there are no leaves). This makes your house naturally cooler in the summer and warmer in the winter, reducing the need for air conditioning and heating (which use energy to run).*

Scoring:

Everyone makes a pot and plants an acorn = 20 points

### 4. Clothesline Relay



Objective: Hang up and take down all the clothes from the clothesline as a group relay in the shortest amount of time possible.

Location: Behind Magothy Cabin

Clue: (read BEFORE the challenge)

Pick your clothes up off the floor!  
I'm sure you've never heard *that* before.  
We like our clothing clean and dry,  
The most Earth-friendly way is to hang them up high.  
Instead of electricity, use a sunny place  
To dry all your clothes in this relay race!

Instructions:

Line up as a group. When the timer starts, the first person should pick up an item of clothing and hang it on the clothesline using the clothespins (1 clothespin per item). Once finished, they should run back to the group and tag the next person in line to hang up an item of clothing. When all the clothes are hung up, the relay continues until one-by-one the team takes down all of the clothing. The timer stops when every piece of clothing has been hung, taken down, and returned to the original pile.

BONUS:

The group will get an extra 5 points if they can explain **why** using a clothesline reduces your ecological footprint. *Answer: Drying your clothes on a clothesline instead of a drying machine saves electricity at home. Hanging your clothes on a clothesline also keeps them from wearing out so they last longer—which means you don't have to buy new clothes as frequently (this also saves resources)!*

Scoring: (timed)

Less than 1 minute 30 seconds = 20 points

1:30-2:30 min. = 10

Greater than 2:30 min. = 5

Possible Bonus: 5

## 5. ROADBLOCK

Objective: Correctly arrange 4 different methods of transportation from greatest to shortest distance they are able to travel emitting an equal amount of carbon per person. (Which travels further emitting just one pound of carbon: a person on a bike, a person on a car, a person on a bus, or a person on a plane?)

Location: Along Severn Trail between Clothesline Relay and Fill the Barrel

Clue: (read BEFORE the roadblock)

Planes, trains, and automobiles,  
We travel by foot, by flight, or by wheels.  
Each method produces some CO<sub>2</sub>  
But if you care about Earth, which one's best for you?  
Arrange how well these things get you there  
With one pound of carbon added to the air.

Instructions:

The group should look at the four different modes of transportation (bike, bus, car, plane) and order them from greatest to smallest by how far they will get you emitting the same amount of carbon **per person**. Another way to explain this to students: *Every method we use to travel (walking, biking, cars, trains, busses, planes) releases carbon dioxide into the atmosphere. When we walk or bike, we breathe and release carbon dioxide into the atmosphere. Cars, planes, busses, and trains burn fossil fuels like oil and coal which also releases carbon dioxide to the atmosphere. Place these methods in order based on which one would get you the furthest emitting equal amounts of carbon per person.*

The students should discuss what they think (no more than one minute) and decide on an order. Once they've decided, have the students pull each mode (ex: toy car represents car, toy plane represents plane) on its string to reveal how far proportionately each one would take you releasing the same amount of carbon per person.

BONUS:

The group will get an extra 10 points if they order the modes of transportation correctly from greatest to shortest distance.

*Answer: Bike, Bus, Car, Plane.. Explain to students that even though biking isn't as fast, much less carbon is released from your body (and in bike production) than from burning fossil fuels to travel an equal distance via bus, car, or plane..*

*\*Adapted from JANUN e.V. Youth Environment Networking Organization in Hannover, Germany*

## 6. Fill the Barrel

Objective: "Fill" the rain barrel by coming up with strategies for conserving water.

Location: Ampitheatre behind Severn Cabin

Clue: (read BEFORE the challenge)

Drip drop, drip drop,  
Fill the Barrel to the top.  
Think of things that we can do  
To conserve the precious blue.  
Work as a team and act it out  
To reduce what we use out of the spout!

Instructions:

Students should sit on the benches in front of the ampitheatre stage. The activity leader should stand on the stage with the rain barrel. The students' challenge is to come up with ways to save water. For each strategy they come up with, they earn a water drop to add to the barrel (with Velcro). As they earn more water drops, they "fill" the rain barrel (8 drops = a full rain barrel).

How will the students think of ideas to save water? **CHARADES!** One-by-one students can come up to the stage and either pick a card (with pre-written strategies) or make up their own (and tell the instructor what it is). Make sure the student shows you their card or tells you their idea before they start acting so you know what the group is trying to guess.

Each student should act out whatever is on the card to try to get the rest of the group to guess what it is (similar to charades). The student can point or use available props, but they cannot speak at all and they must stay in the stage area. Once the students guess the strategy, either choose a volunteer or select the next student down the line to come up and act out the next strategy.

If a strategy is too difficult to act out or the group is not guessing it, a student can “Pass”. If a student passes their turn is over. Each group is only allowed to “pass” **twice**. If they try to “pass” a third time, the game is over. Otherwise, the game ends after **three minutes** (from when the first student starts acting). At the end of three minutes, the group can add a water drop to the barrel for how many strategies they acted out and guessed correctly (if 8 or more, the barrel is full).

Hint:

The strategies can include anything from uses for rain barrel water, ways to conserve water at home, and reducing your water footprint by reusing products or choosing not to buy products that take a lot of water to produce. If a student comes up with an idea that is already written on the cards they can still act it out.

Strategies:

- 1/8 barrel for each strategy (must think of 8 to receive full credit)
- Examples of strategies:
  - Uses for rain barrel water (wash your car, water a garden, anything that doesn’t include sanitizing or eating/drinking)
  - Turning off the faucet while you brush your teeth
  - Take showers instead of baths
  - Take shorter showers
  - If it’s yellow let it mellow...
  - Wash clothes or dishes only when you have a full load
  - Only wash clothes when they are truly dirty
  - Re-use or use hand-me-downs instead of buying new things (ex: it takes 1,800 gallons of water to produce one pair of jeans)

Scoring after 2 minutes:

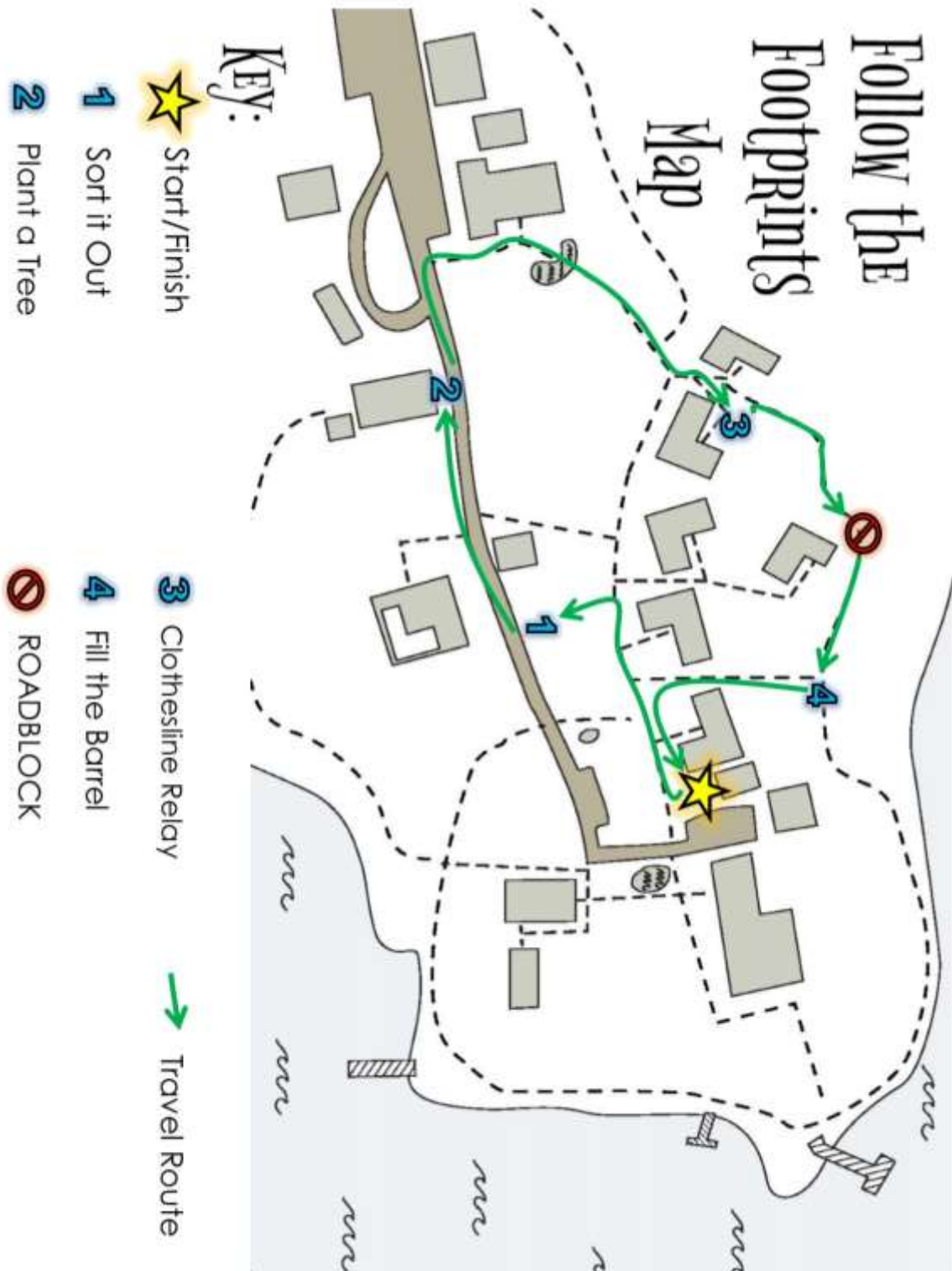
Full barrel = 20 points

3/4 barrel = 15






1/2 barrel = 10

1/4 barrel = 5

Supplement D: Map



**Supplement E: Conservation Point Classifications**

<b>0</b>		<b>Saplings</b>	<p>With the right mix of nutrients, water, and sunlight a young sapling will grow into a strong tree. Just like a sapling, you are starting to understand your role in protecting the environment. With the right mix of education and motivation you can grow into a steward of the Earth! <i>What are some things you could do to shrink your ecological footprint and conserve resources?</i></p>
<b>10</b>		<b>Emerging Environmentalists</b>	<p>You're off to a great start! You've already learned and tried out some strategies for reducing your ecological footprint and conserving resources.</p>
<b>20</b>			<p><i>What are some other strategies you could use at school or at home to reduce your individual ecological footprint?</i></p>
<b>30</b>		<b>Green Machine</b>	<p>You've already taken some major steps towards becoming an environmental steward!</p>
<b>40</b>			<p><i>How could you improve your daily actions to further shrink your ecological footprint become a super steward?</i></p>
<b>50</b>			<p><i>What are some other strategies you could use at school or at home to reduce your individual ecological footprint?</i></p>
<b>60</b>		<b>Super Stewards</b>	<p>A steward is someone who takes care of or looks after something. You demonstrated today that you know how to take care of our local environment and conserve resources!</p>
<b>70</b>			<p><i>What could you teach your family or friends at home about being an environmental steward?</i></p>
<b>80</b>		<b>Earth Champions</b>	<p>Wow—you know what it takes to conserve and protect Earth's resources for others and the future!</p>
<b>90</b>			<p><i>How can you inspire others around the world to take steps to shrink their ecological footprint and conserve?</i></p>
<b>100</b>			<p><i>How can you inspire others around the world to take steps to shrink their ecological footprint and conserve?</i></p>
			

### **Supplement F: Vocabulary**

**Ecological footprint**—an ecological footprint is the measure of the pressure we put on the planet based on the amount of resources we use, the amount of land we take up, and the waste and pollution created as a result of our actions.

**Steward**—a steward is someone who takes care of something. A Chesapeake Steward is someone who takes care of the Chesapeake Bay. In this lesson we go one step further to learn how to be stewards who take care of the Earth as a whole.

**Conservation**—saving or using less of; we conserve resources so there is some left for other people, animals, and future generations.

**Natural resources**—things that are found in nature and can be used by people. Earth's natural resources include light, air, water, plants, animals, soil, stone, wood, minerals, and fossil fuels.

**Deciduous Tree**—trees that lose their leaves seasonally (as opposed to evergreens). Here in Maryland, deciduous trees lose their leaves at the end of autumn in preparation for the dry, cold winter.