



# Pollination Empowerment: Student Led Garden Design

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*State Arboretum of Virginia, University of Virginia*





**University of Virginia's  
Blandy Experimental Farm  
&  
The State Arboretum of  
Virginia**

**Blandy's Mission:**  
To increase understanding of  
the natural environment  
through research and  
education

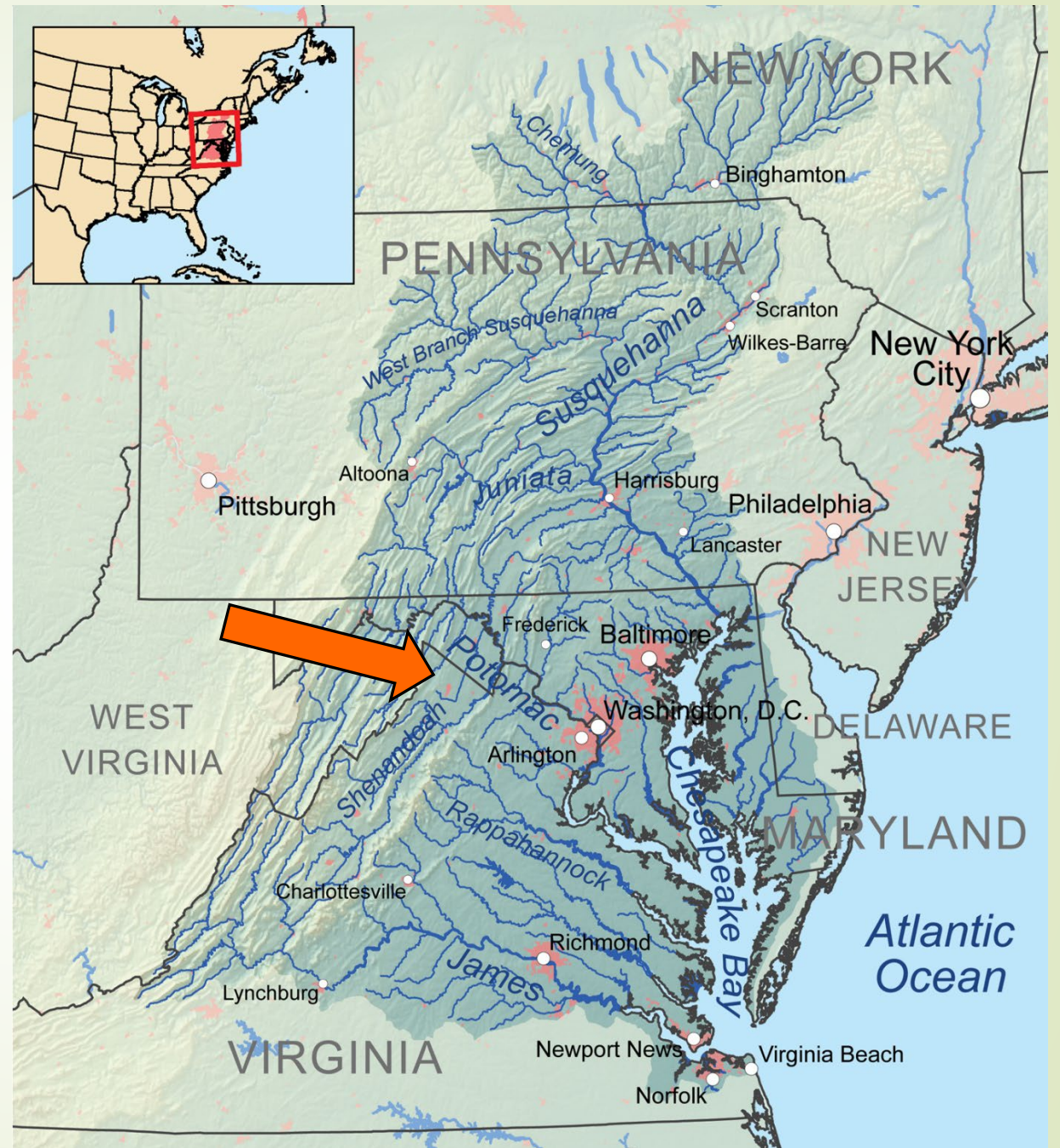


**BLANDY**  
EXPERIMENTAL FARM



University  
of Virginia







# State Arboretum of Virginia Education Program



**Our program mission: To stimulate scientific exploration, discovery, & stewardship of our natural world by fostering a learning community among preK-12 students, educators, & scientists**



# The Challenge:

- ▶ How can we facilitate STUDENT-LED garden planning, design, and planting?





# The 4<sup>th</sup> grade garden site at their school

## Six 7' x 5' triangular raised beds



This project was funded through a grant from the Chesapeake Bay Trust, award # 13246





How much space does one plant need?



## 4<sup>th</sup> graders research & plan a pollination garden







## What garden plants are good for pollinators?

### Plants for pollinators information

Plant name	
Common: Golden Ground sel	Scientific (genus and species, just like my last and first name) <i>Packera aurea</i>
Height it can grow to: 6-12 inches	Width (spread) it can grow to: 18-24 inches
Pollinators that like this plant: native bees	<input type="checkbox"/> Butterflies <input checked="" type="checkbox"/> Bees <input type="checkbox"/> Moths <input type="checkbox"/> Hummingbirds <input type="checkbox"/> Other types:
Flower Color: yellow	Bloom time: Late spring to early summer
Is there any other interesting information about this plant that you learned? Incredibly showy spring bloom	
Why I think this would be a good plant for our school pollinator garden: Vigorous growth allows for great erosion control	

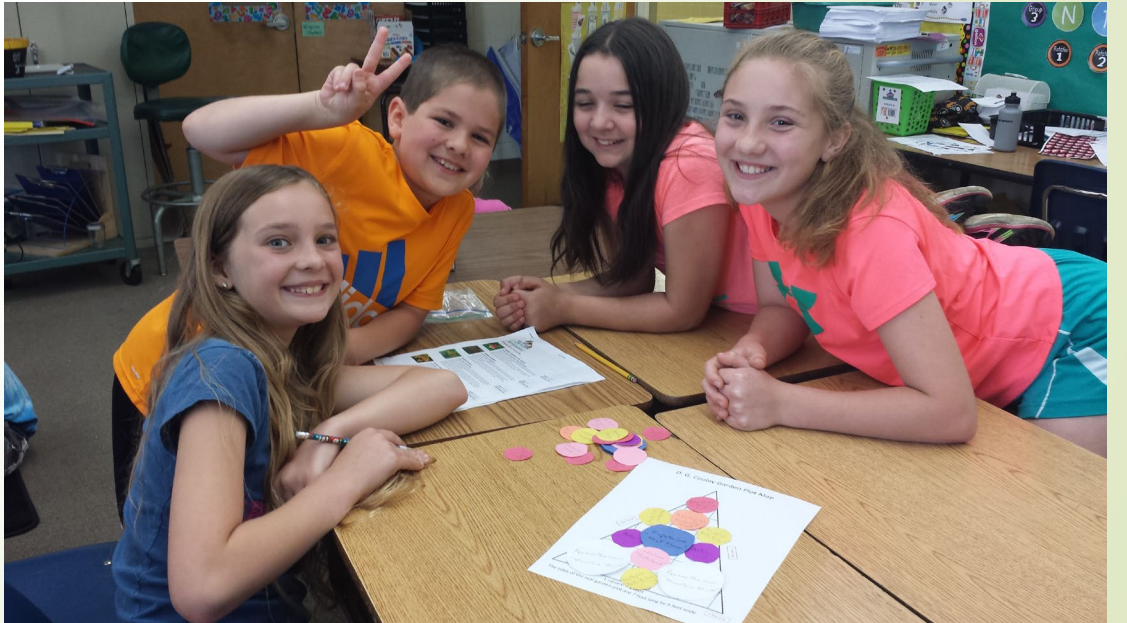
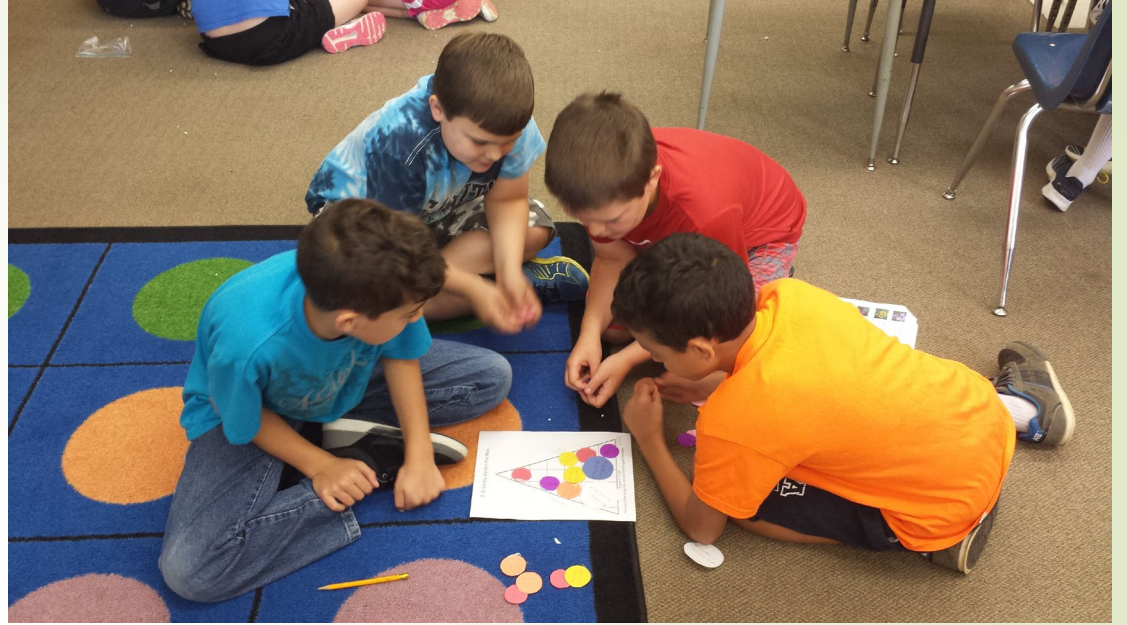




US NATIVE  
LITTLE LANTERNS  
PERENNIAL

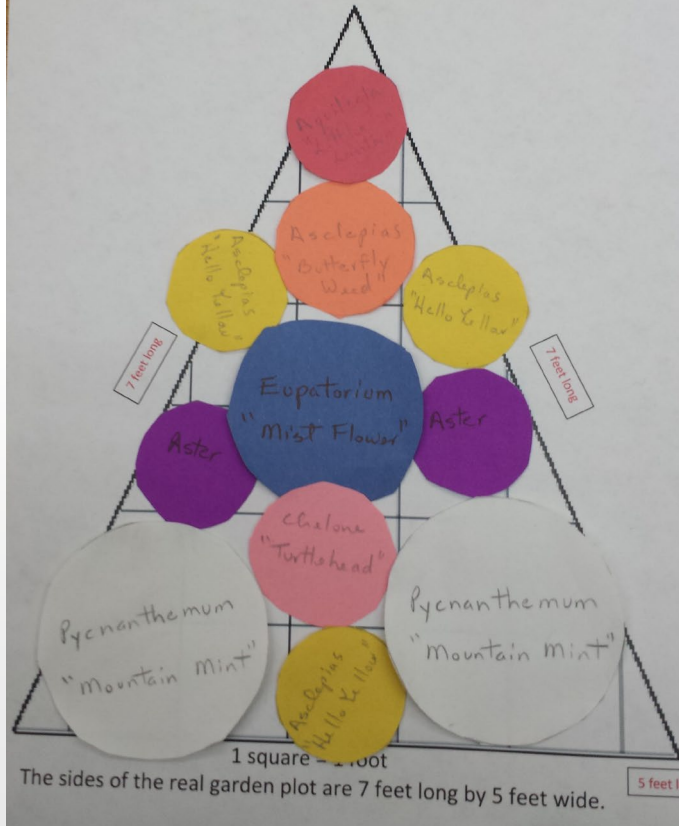
US NATIVE  
WILD AGERATUM  
PERENNIAL



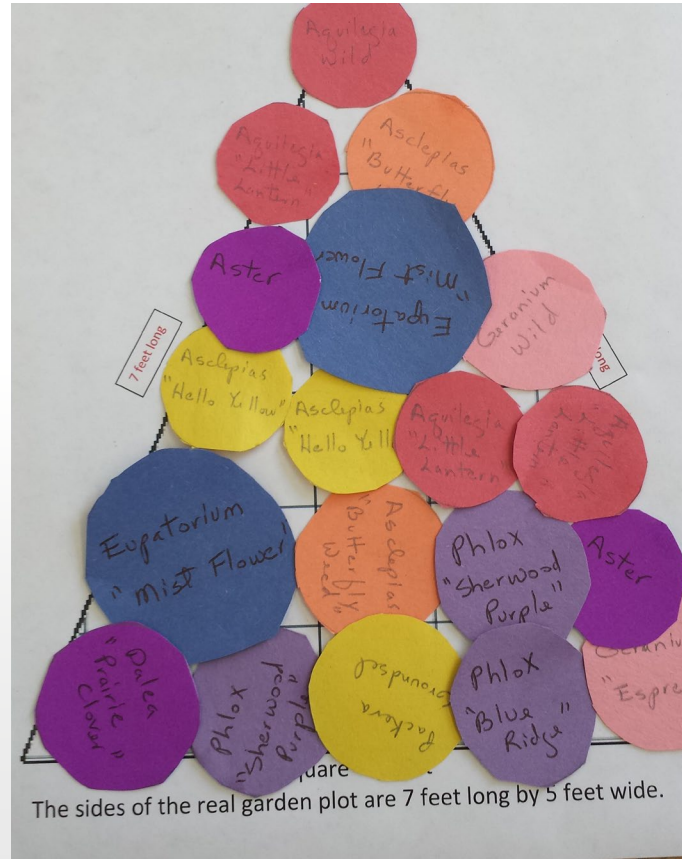




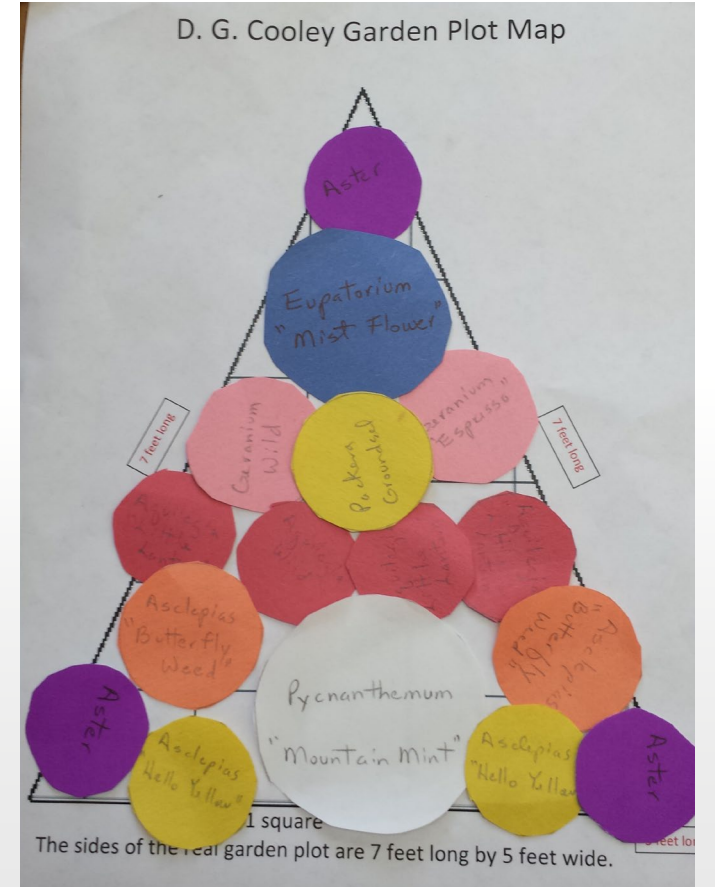
D. G. Cooley Garden Plot Map



D. G. Cooley Garden Plot Map



D. G. Cooley Garden Plot Map











**Let's design a garden!**



# Supporting Activities

<https://blandy.virginia.edu/content/ed-programs-activities-and-lessons>

## What Plants are Good for Pollinators?

**Goal:** Students use online & printed materials to help select the native plants for their schoolyard pollination gardens.

What garden plants are good for pollinators?

Plants for pollinators information

Plant name	
Common: <i>Eastern red columbine</i> <i>Bluejay</i>	Scientific (genus and species, just like my last and first name) <i>Aquilegia canadensis</i>
Height it can grow to: 10 in	Width (spread) it can grow to: 8-12 in
Pollinators that like this plant: <i>B. bumble bees</i> <i>humming birds</i> <i>butterflies</i>	<input checked="" type="checkbox"/> Butterflies <input checked="" type="checkbox"/> Bees <input type="checkbox"/> Moths <input checked="" type="checkbox"/> Hummingbirds <input type="checkbox"/> Other types:
Flower Color: <i>red/pink</i>	Bloom time: <i>April-ish</i>
Is there any other interesting information about this plant that you learned? <i>insects lay eggs in the stem. when the eggs hatch they eat the inside.</i>	
Why I think this would be a good plant for our school pollinator garden: <ul style="list-style-type: none"><li>• it does not take up much space.</li><li>• in school when blooms.</li><li>• attracts cool pollinators.</li></ul>	



Watersheds: Our Home, Our Life Project

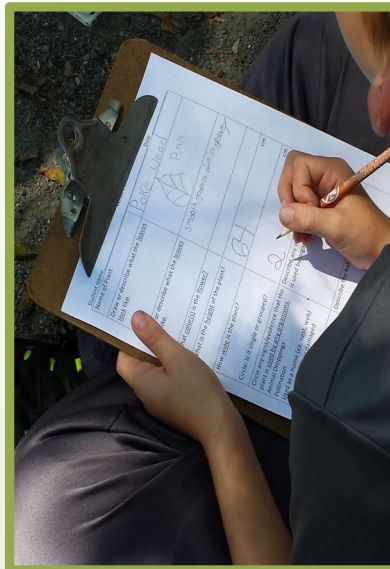




# Supporting Activities

## What Plant Where?

**Goal:** Students explore & observe native plants for attributes (height, width, flower color, leaf shape, & habitat) that should be considered when choosing plants for a native plant garden. Students understand that a diversity of plant types is important for a native plant garden.



What Plant Where?	
Student Name _____	Date _____
Name of Plant	SEA OATS
Draw or describe what the <u>leaves</u> look like.	Long pointy green. (grassy) point tip small.
Draw or describe what the <u>leaves</u> feel like.	smooth sticky
What <u>color(s)</u> is the <u>flower</u> ?	NO
What is the <u>height</u> of the plant?	59 cm
How <u>wide</u> is the plant?	65 cm
Circle: Is it single or <u>grouped</u> ?	
Circle any signs/evidence that the plant is <u>used by any organisms</u> . Animal Droppings Pollination Used as a home (ex. nest, <u>web</u> ) Parts are <u>eaten</u> or damaged	Describe any other evidence that the plant is used by organisms.  Chew
What is the <u>habitat</u> like? (circle all those that apply) Sunny <u>Shady</u> Wet <u>Dry</u> Rocky <u>Leaf litter</u>	Describe the habitat.  humid grass + forest



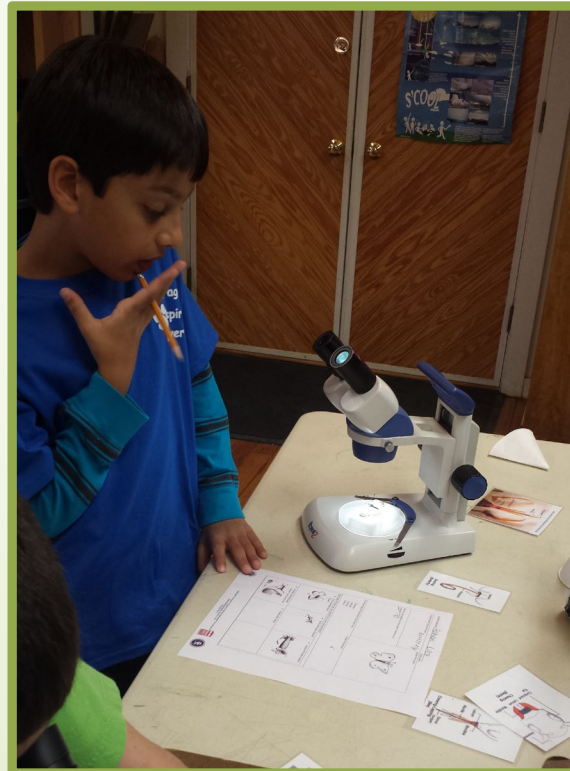




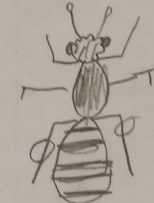
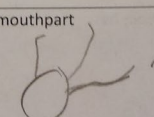





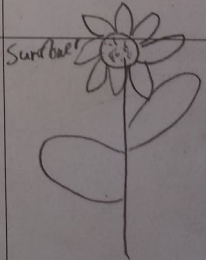
# Supporting Activities

## Insect Adaptations



**Goal:** Students explore ways that insects collect pollen & compare mouthparts to determine if an insect collects pollen or nectar. What are some adaptations that insects have that help them to feed on different foods & from different parts of plants?



Data sheet

Insect name/Type of insect <i>Bee</i>	Draw the insect 	
Do you see pollen on the insect? Where is it located? <i>yes!! on the legs</i>		
Circle the type of mouthpart the insect has. <input type="checkbox"/> Chewing <input type="checkbox"/> Lapping <input checked="" type="checkbox"/> Sucking <input type="checkbox"/> Other?	Draw mouthpart  <i>mouth</i>	
What type of flower do you predict this insect will pollinate?		
<input checked="" type="checkbox"/> Flat and wide open flower 	<input type="checkbox"/> Short and tube shaped 	<input type="checkbox"/> Long and tube shaped 
<input type="checkbox"/> A large 'sleeping bag' flower it can climb into 	<input type="checkbox"/> Draw other ideas 	<i>Sunbat</i> 

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# Pollination Garden Research, Design & Planting Activities: Alignment with NGSS 3-Dimensional Learning

Scientific & Engineering Practices	Cross-cutting Concepts
<ol style="list-style-type: none"> <li>1. Asking Questions &amp; Defining Problems</li> <li>2. Developing &amp; Using Models</li> <li>3. Planning &amp; Carrying Out Investigations</li> <li>4. Analyzing &amp; Interpreting Data</li> <li>5. Using Mathematics &amp; Computational Thinking</li> <li>6. Constructing Explanations &amp; Designing Solutions</li> <li>7. Engaging in Argument from Evidence</li> <li>8. Obtaining, Evaluating, &amp; Communicating Information</li> </ol>	<p>Patterns</p> <p>Scale, Proportion, &amp; Quantity</p> <p>Structure &amp; Function</p>
Disciplinary Core Ideas	
Life Sciences	Engineering, Technology, & the Applications of Science <small>From: <i>A Framework for K-12 Education</i>, National Research Council, The National Academies, 2011</small>
<p>LS1. A Structure &amp; Function</p> <p>LS1. B Growth &amp; Development of Organisms</p> <p>LS2.A Interdependent Relationships in Ecosystems</p> <p>LS4.D Biodiversity &amp; Humans</p>	<p>ETS1.A Defining &amp; Delimiting and Engineering Problem</p> <p>ETS1.B Developing Possible Solutions</p> <p>ETS1.C Optimizing the Design solution</p> <p>ETS2.A Interdependence of Science Engineering, &amp; Technology</p>





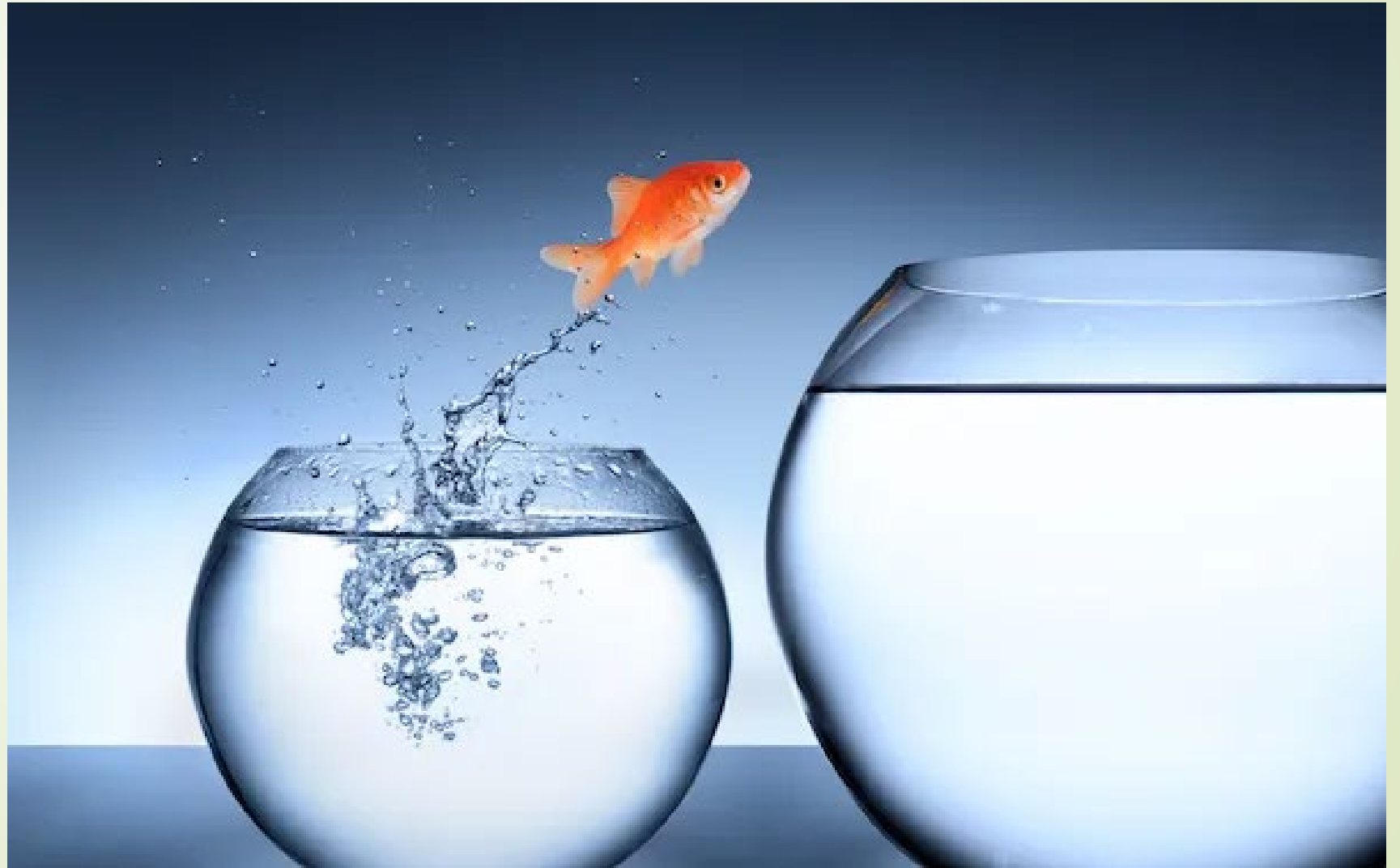
# Virginia Science Standards of Learning

## Science and Engineering Practices:

- ▶ Asking questions & Defining Problems
- ▶ Planning & Conducting investigations
- ▶ Interpreting, analyzing, & evaluating data
- ▶ Constructing and critiquing conclusions & explanations
- ▶ Developing & Using Models
- ▶ Obtaining, evaluating, & communicating information



# Scaling up







# 5<sup>th</sup> Grade Riparian Buffer

This project was funded through a grant from the NOAA Chesapeake Bay B-WET Program, award # NA18NMF45703152





● ● ● ● ● ● ● ●

← Direction of Water Flow

Your class will be planning one section (or part) of the riparian buffer garden. The section you get to design is 15 feet long and 15 feet wide.

What is the area of your section? \_\_\_\_\_

Each square on the grid is one foot long and one foot wide. For your design, consider how much space the different plants will need when they are fully grown.

Your school is way up here
 ↓













# 7<sup>th</sup> grade pollination garden

This project was funded through a grant from the NOAA Chesapeake Bay B-WET Program, award # NA18NMF45703152



# Creating a scale model your pollination garden

Cut out disc indicating the appropriate diameter of your mature plants. Use the color paper to match the color flower that it produces. Each 1/2" box = 1 ft. Use this scale for determining the size of your discs. Label each disc with the species of plant and it's height. Arrange your discs on the map of our garden plot below. Consider the following as you play with the arrangement:

- Are colors distributed in a visually appealing way?
- Do you have taller plants in the back and shorter plants in the front?

When you are satisfied with your arrangement, you may glue your discs down and submit your plan to your teacher. Put your name on THE BACK. We will be voting on our favorite garden plan! The finalist from each class will be submitted to your 7th grade teachers for final voting!

## J-WMS Native Plant Garden "Wish List" Garden size 18' x 18' (estimate) Most plants will be in 1 quart pots (4.75")

Common Name	Scientific Name	Attracts	Bloom color	Bloom time	Mature Height	Mature Diameter
Butterfly weed	Asclepias tuberosa	Monarch butterfly	Orange	May-Sept	1.5-3 feet	1.5-3 feet
Wild Geranium	Geranium maculatum	Native bees	purple	April-June	2 feet	18 in
Whorled Coreopsis	Coreopsis verticillata "Creme brulee"	Birds and Butterflies	Yellow	May-Aug	2.5 ft	2ft
Woodland sunflower	Helianthus divaricatus	Native bees	Yellow	Aug-Oct	2-6ft	1-3ft
Scarlet beebalm	Monarda didyma	Hummingbirds, butterflies, bees	Red	July-Sept	4ft	3ft
Golden	Packera	Butterflies	Yellow	March-May	1-2ft	1-1.5 ft

# Designing your pollination garden

- Your garden should include a minimum of 5 different species of NATIVE plants
- Should have a variety of colors/textures/heights for visual appeal
- Your garden should attract a minimum of 3 different species of pollinators. Fill in the following chart:

	Common name	Flower Color	Pollinator(s)	Mature Height	Mature Diameter	Environmental requirements (sun/water/soil)	
1 ✓	Butterfly weed	orange	Wasp	4-5ft ↑	3-4 ft ↑	fast draining soil full sun	1 inch per week for water
2 ✓	blue wild indigo	blue	bees butterfly humming birds	24-36 inches	12-24 inch	sun exposure: full soil type: moist	one inch of water every week
3 ✓	daffodiles	yellow white-ect	Bees	6-30 inch	6-12 inch	full sun/ partial shade rich and moist	Water once planted and until first winter
4 ✓	christmass fern	Green	chutapillers	1.5-3 ft 2.5 ft	1.5 ft	loose turf soil part-full shade	water once a week
5	golden rag wood	yellow	Butterflies Bees	1-2 ft	1-1.5 ft	well drained full sun moist soil	don't need water drain to it unless long time w/out rain fall
6							
7							
8							







# Measuring, laying stone, & planting





# Student Centered Garden Design & Planting

- ▶ Provide **learning opportunities** so that students understand:
  - ▶ Plant-insect/bird adaptations (structures & functions)
  - ▶ Importance of planting native plants
  - ▶ Size of various plants at maturity (height & width)
- ▶ Have students, along with teachers & administrators, **identify the area** to be planted (location & size). Get approval from the facilities manager, too.
- ▶ Provide resources for students to **research plants** to include in their garden (It's helpful to narrow the potential choices to plants that are adapted to the planting site & that you know you can purchase. Be sure to provide plenty of plants from which to choose.)
- ▶ **Make a scaled grid** for the garden site (for younger kids). Middle & high school students can use graph paper & determine their own scale.
- ▶ For elementary students, it is helpful to **create circles** scaled to the garden design grid that represent the color & width of the plants at maturity. These are used to design the garden. Older students can use colored pencils to design their gardens.
- ▶ **Test the design** outside using circles cut from newspaper to represent the full width of the plant at maturity & PVC pipe (or sticks) cut to the height of the plants at maturity. Students replicate their design in the garden using the circles & PVC & adjust, as needed, before planting.
- ▶ **Plant** the garden!!!





# We grow scientists at Blandy!

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**Thank you!**





# We'd love to have you Contact Us!!!



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