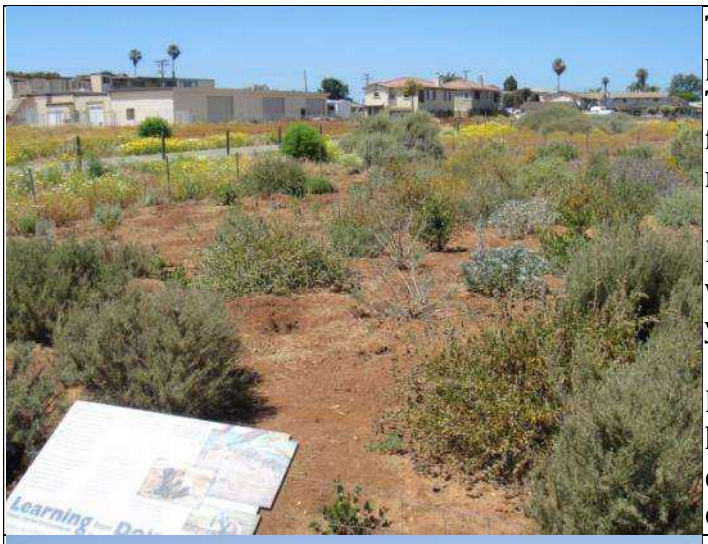
Bird & Habitat Study

Use your imagination to take yourself on a virtual field trip with Ocean Connectors!

	Welcome to the San Diego Bay National Wildlife Refuge! This is where we'll be conducting habitat restoration today. Look, you can see San Diego Bay in the distance. How do you think a Refuge helps plants and animals? Write down your answer.
	We are right next to the Bayshore Bikeway, a 24 mile path that circles the Bay. You can come here anytime for free outdoor fun! You're going to meet park rangers today from the U.S. Fish & Wildlife Service. A park ranger's job is to protect and preserve national, state, and local parks. They are like law enforcement for nature.
	Signs like this are posted at entrances to Wildlife Refuges. There are some important rules for visiting Refuges: 1. Leave natural objects like stones, feathers, and flowers where you find them. 2. Do not touch any wild animals or insects. 3. Stay on marked pathways. 4. Be respectful to other visitors. 5. No yelling, throwing objects, or other destructive behavior. 6. Clean up all your trash! Photo Credit: Steigerwald Lake

	Today at the Refuge, you will participate in habitat restoration. This means you will be helping to fix up the environment so it returns to the way it was before. Here are some native plants that were planted by students just like you on this same field trip. Native plants provide a good habitat for wildlife and are usually drought-tolerant, this means they can survive on very little water.
	As you turn to your right you'll see pretty yellow flowers growing around the Otay River. But don't be fooled! These are called chrysanthemum and they are invasive. Invasive plants are usually bad. They are weeds that do not belong in this area and they steal nutrients, water, and sunlight from the other plants. They tend to grow out of control and take over all the open space.
	As you walk towards our "home base" area and take a seat on the bench, take a quick look through the telescope. Different shaped lenses inside the telescope help us see things that are really far away. Try to spot the Coronado Bridge.

	For our first activity, we'll split into 6 teams and each group will receive their own bucket. Everyone will wear gloves and walk around pulling out weeds. Make sure you only pull out the invasive plants! Watch your step so you don't step on any native plants.
	Here is another type of weed that is growing around our site. This is called ice plant. Each one of these pickle-shaped leaves soaks up tons of water. What a selfish plant! If you squeeze the leaves, water oozes out. Try to pull them out by the roots so they don't grow back!

	How does your team know how much weeds you pulled out? We'll use the formula for volume. Volume = Base x Width x Height We must pat the pile down into a rectangle or cube shape before taking the measurements. Time for some math practice.
	We use a meter stick to measure the pile. Calculate the total volume of this pile using the numbers below. The units are centimeters. Base = 35 cm Width= 25 cm Height = 12 cm Volume = ? Write down your answer.

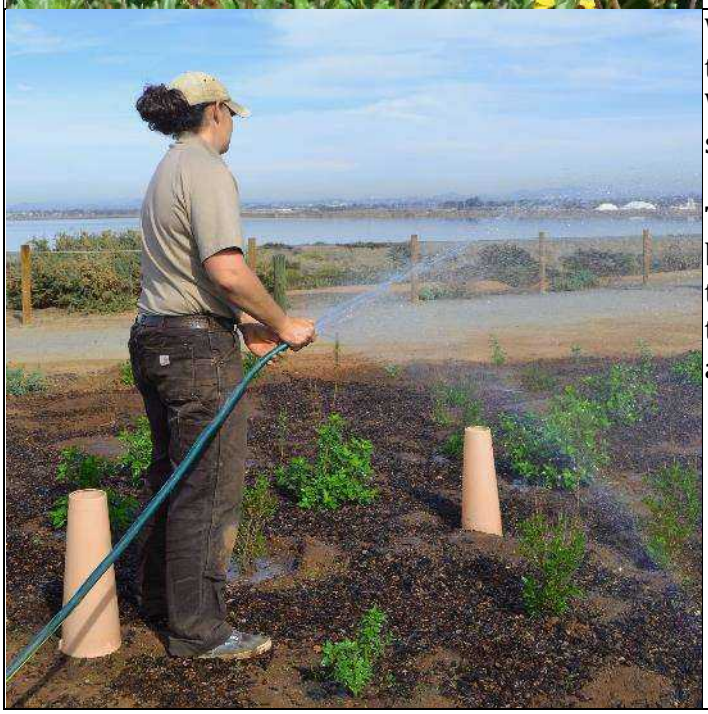
	Wow! Look at how many weeds one class can pull out in just 10 minutes. This pile contains another type of common weed called horehound.
	Another important way to help the environment is to pick up trash. Littering is illegal and trash can smother plants and kill animals. Look at all the litter this team found! Animals mistake trash for food and eat the trash that humans leave behind. Trash, especially plastic, can't be digested by animals.
	It is important to protect ourselves when picking up trash. Wear gloves and never pick up sharp objects. We can use special equipment, like these litter-getter sticks that help us grab trash without having to touch it at all.

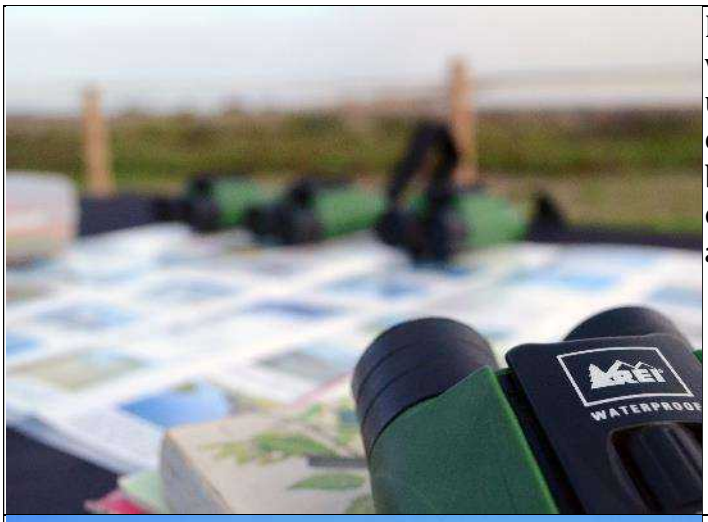
	It's especially important for us to pick up the litter around the Otay River since that trash could get carried out to sea and harm ocean animals. When it rains, trash from the streets and roads get washed into this river. This is another reason we never litter—it all will end up in the ocean.
	We weigh the trash using handheld scales. This is similar to what real scientists do when they are collecting data on an animal or habitat. Let's use the scales to see which team collected the most trash. We will take this measurement in kilograms (kg).
	Now that we have helped to clean up the habitat, we can help restore it further by planting native plants. Pay attention to the park rangers for instructions. Each student will get their own plant to plant in the ground. You will learn its name and draw a picture in your journal.

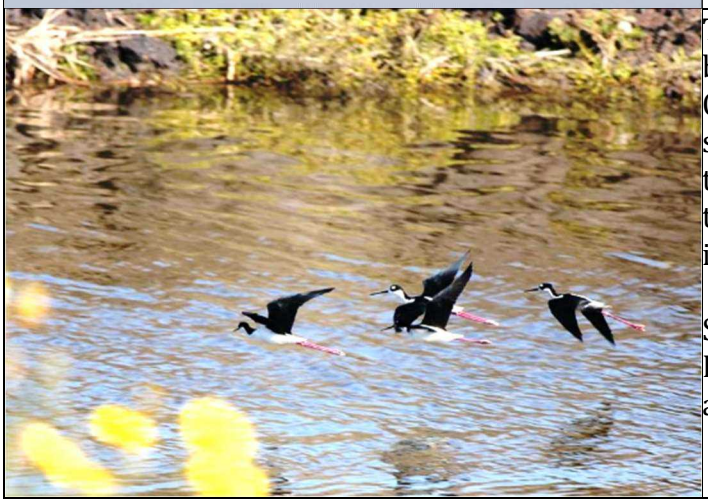
	This native plant is called bladderpod. Draw a picture of it and write down its name in your journal. Bladderpod is a tough plant and can handle harsh weather, poor soil, and drought. It gets its name from the green bulb-like fruits that grow from it. The yellow flowers are a favorite of hummingbirds. The harlequin beetle also loves this plant.
	Pick up your plant, grab a shovel and some gloves, and let's get planting! Notice the shovels have flat edges on the sides. That's so you can push the shovel into the ground by stepping on it with your shoe.

	Carry your shovel pointed downward and step carefully so you don't damage any other plants. Many of these plants were installed recently by other school groups and are still trying to grow. See the little orange cones? Those help protect small plants from herbivores, like rabbits, who might eat them.
	We need to make sure we do not plant too closely to one another. Plants need enough nutrients, sunlight, and water to grow – and we don't want to make our plants compete. Once you have found a good spot for your plant, dig a small hole, and take the plant out of its black container. Loosen up the roots by lightly "tickling" the base. This helps the plant spread its roots in the ground to absorb more water.

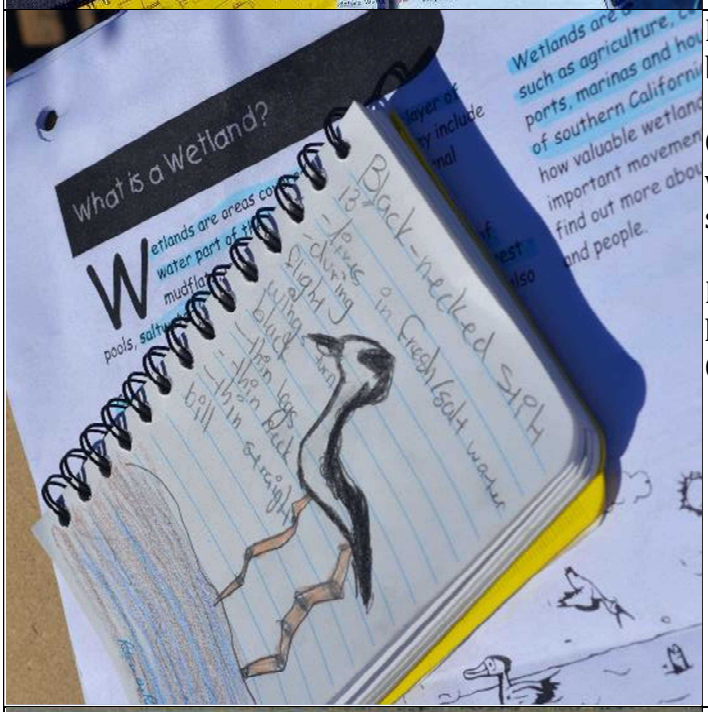
	Look what we found living inside the soil of this plant! Earthworms are great for gardening. Their droppings act as fertilizer and give nutrients to the plants. They also create small tunnels underground which helps loosen up the soil and let in more air and water for the plant to grow.
	Fill in the hole around your plant, but leave a little dent around the base of the plant, so the surrounding dirt is slightly higher. This donut-shape with your plant in the middle is called a “berm.” This helps water flow toward the plant and lets it absorb more water.
	You can add small rocks around the base of your plant to help it trap water even better.

	This beauty is called California sunflower! Bright flowers like these attract insects for pollination, such as bees. Why do you think it's important to put your plant in the right location?
	We'll give the plants some water to help them get established. Watch the ranger apply a light spray evenly across all the plants. To conserve water at home, it is best to water your garden during the morning or early evening so that the water doesn't evaporate as quickly.

	Next we'll head to the bird watching station. Binoculars are used by scientists to see far away objects in better detail. Most binoculars are small enough to be carried on hikes and trails. Some are even waterproof!
	We'll get to meet a marine life expert who will show us how to use the binoculars to spot birds around San Diego Bay. Write this next sentence down in your journal. An aviculturist is someone who is a bird expert and may help rescue birds that need help.
	Carefully grab a pair of binoculars and let's see what we can find. Make sure to stand still whenever you use binoculars, and wear the string around your neck so they don't fall. Look at how the expert is properly holding the binoculars with both hands. You can identify birds by their different markings and coloration, and sometimes even by their sound.

	Look, black brants! They migrate thousands of miles from the Arctic to spend the winter in Southern California. No other geese nest as far north as the brant. Brants only come to San Diego in the winter, so what a lucky sighting for us! Their unique black and white markings help us tell them apart from other birds.
	Wow, there's an osprey catching a fish from the river. Osprey are birds of prey and they swoop towards the water and use their sharp talons to grab fish. Then they angle the fish in the air to reduce wind-resistance and fly faster. Notice how its hooked beak is sharp for tearing apart food!
	There is a flock of birds called black-necked stilts flying over the Otay River. Their pink legs really stand out. Black-necked stilts have the longest legs in proportion to their body than any bird—including flamingos! Stilts can be seen around San Diego Bay hunting for small fish and invertebrates along the shore.

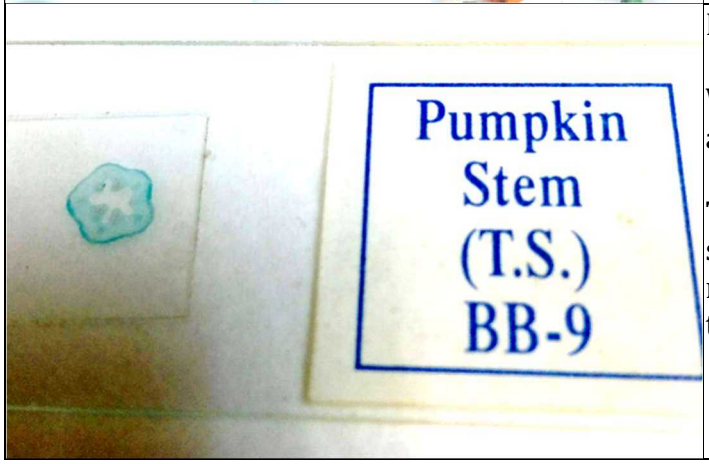
	Look above us! It's a great blue heron! These are large shorebirds that usually wade in the water along coastlines and wetlands, but sometimes they can also be seen in grassy fields. Their long necks and sharp beaks help them strike their food fast.
	There's a great egret that just landed in the river. Great egrets have a yellow beak and black feet. A bird's coloration helps us identify their species and helps scientists keep track of the birds they are studying.
	Look at how many amazing birds come through this area. Birds migrate along our shores and use wetlands, estuaries, and bays like this one to nest, rest, and feed. That is why it is so important to keep San Diego Bay clean and healthy!

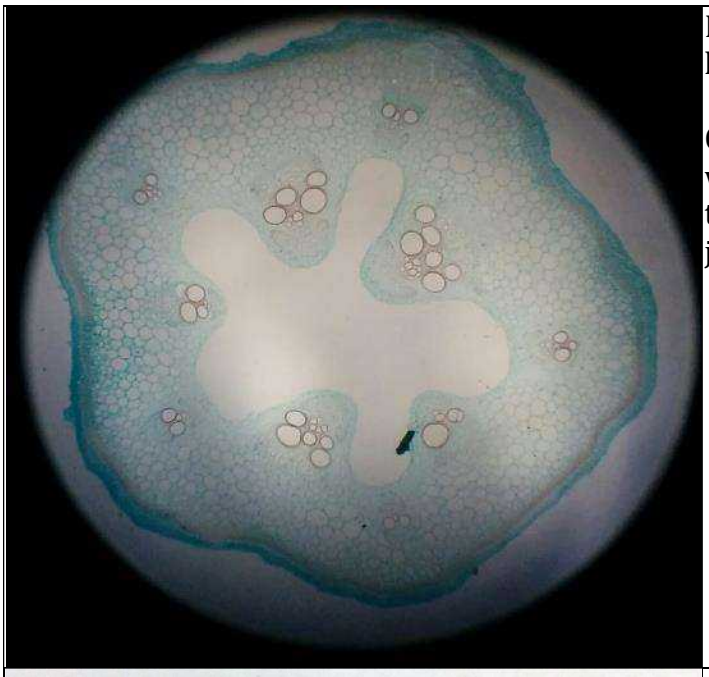
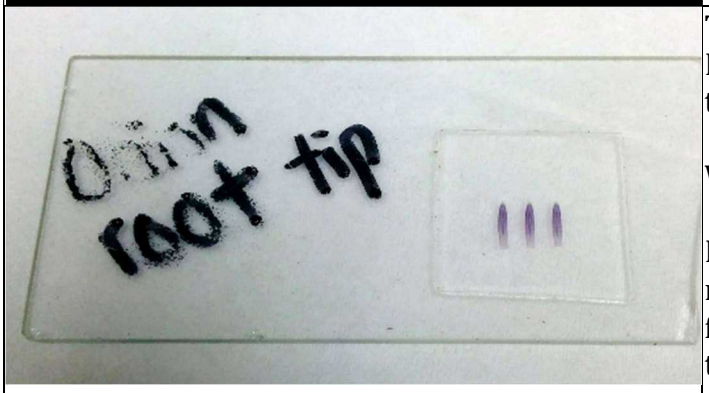
	Draw a sketch of one of these birds and grab some colored pencils or crayons to color it in. This is something a real scientist would do to help identify and label a bird correctly in the field. Label as many parts of the bird as possible (such as the beak, eyes, legs, wings, and tail).
	Look at this student's drawing of a black-necked stilt as an example. Once you finish your drawing, we'll head over to the microscope station. But first, we need one volunteer to help take a water sample from the Otay River.
	We'll take the sample over to the microscopes so we can see what types of animals and plants live in this water. We use a plankton trawl to collect the sample, just like real scientists.

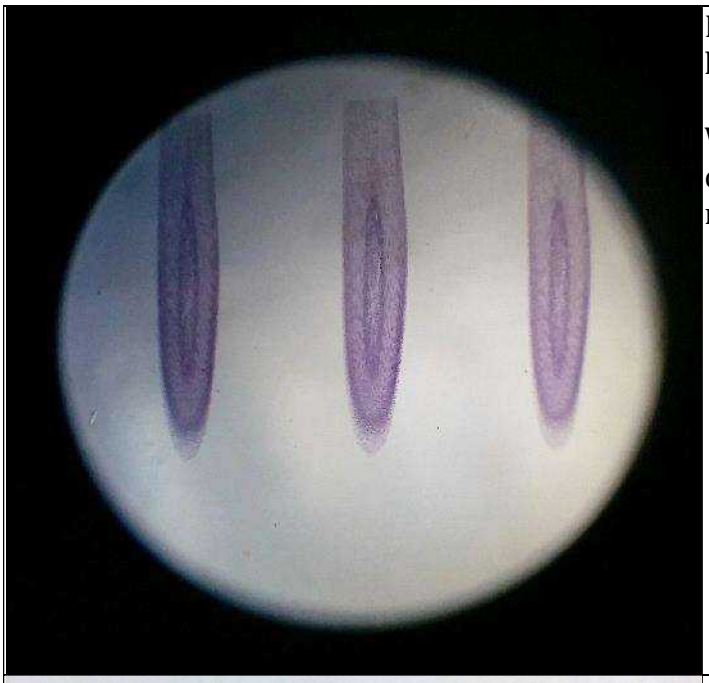
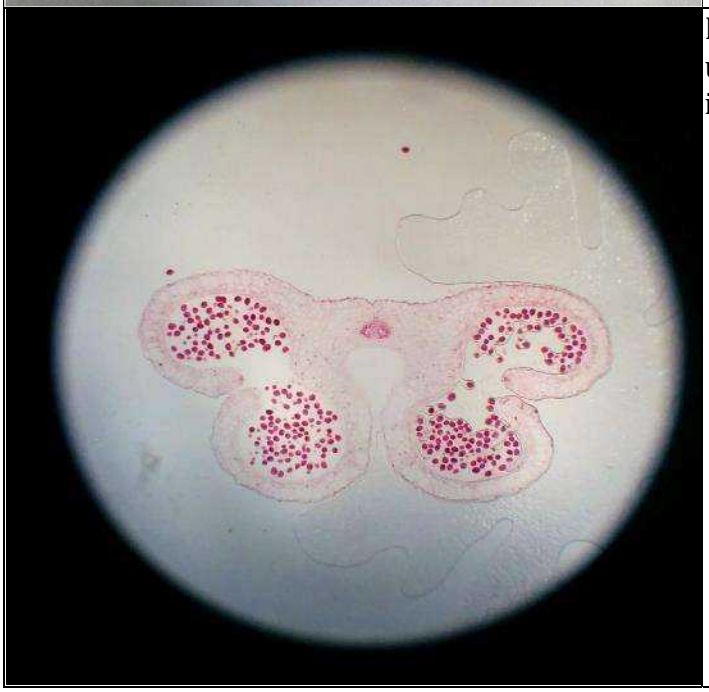
Microscopes help us see things that are very small in great detail.

This type of microscope is called a Magiscope, and they can be used indoors or outside.

Place the item gently on the microscope plate, then slide the neck of the microscope up and down to zoom in and out. Make sure the clear rod is facing the sun, which powers these microscopes.

	Let's take a look at a few items under the microscope and make drawings of what we see in our journals. What other types of equipment do you think scientists use?
	Here is a slide of a pumpkin stem. What is the purpose of the stem of a plant? The plant stem not only provides structural support, but also allows nutrients and water to reach all the parts of the plant.

	Here is what the pumpkin stem looks like under the microscope! Can you see all the holes for the water and nutrients to travel through? Draw this in your journal.
	This is the tip of an onion root. Like the onions you might eat in a taco, burger, or salad. What do roots do for a plant? Roots allow plants to collect nutrients (like trace elements) from the ground. This allows them to grow and helps give edible plants a favorable taste.

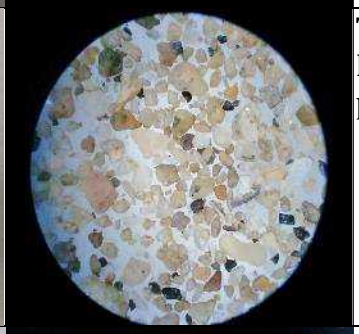
	Here is what the onion root looks like under the microscope! What do you think the tube in the center is for? Remember, this is a root!
	This is a section of lily anther. The anther is the part of the plant that produces pollen. Draw a flower and add an arrow pointing to where the pollen is located.
	Here is what lily anther looks like under the microscope. Draw this in your journal.

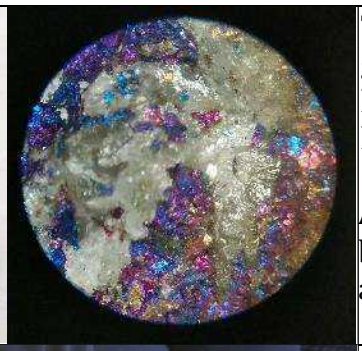
Look closely at the structure of this bird wing and then sketch it in your journal.

Observe the direction, shape, and size of the feathers. How do they differ and how are they used by a bird?

How do you think the shape of a wing helps a bird fly? Write down your answer in your journal.

Under the microscope you can see the individual feathers and bone details.

		This is sand from Hawaii! Have you ever been to Hawaii? Look at the color, size, and shape of the grains of sand. Let's compare this sand to sand from other beaches in the world. Look closely at the next few slides and notice their similarities and differences.
		This is sand from Nayarit, Mexico. Remember Ocean Connectors has programs for kids in Nayarit too.
		Here is sand from Pacific Beach, which is in San Diego.
		And last but not least, here is sand from Southern Australia. That's over 8 thousand miles away from here!
		This is a stingray barb! If you look up close, you can see that it has sharp, jagged edges. This is a defense mechanism that stingrays use to defend themselves from predators.

 	There are many types of rocks and geodes in the world. What may look like an ordinary rock could have beautiful crystals inside! As we head back over to our home base, think about what we can do at home to help the environment.
	You can plant native plants and seeds in your yard like we did today. Here are some seeds from the California poppy which you can take home. The California poppy is our state flower. Planting native plants in our yards helps save water and protect other native plants and animals in the area. You can also help pick up trash in your neighborhood, join a beach clean-up, and tell others what you learned today!
U.S. FISH & WILDLIFE SERVICE DEPARTMENT OF THE INTERIOR	The U.S. Fish & Wildlife Service is essential to helping provide this field trip for you! Let's give a special thanks to the U.S. Fish & Wildlife Service park rangers who joined us today. They helped provide the plants, shovels, and watering cans, and gave us a chance to learn from real experts!

Photos taken by Anna Mar unless otherwise credited