Activity description:

In this investigation you will be dipping into the pond! Using long-handled nets, you will take a **sample** of the **macroinvertebrates** that live in the pond **ecosystem**. You'll get a chance to look at these creatures up close and personal. You'll have a guide to help you identify them. You'll be able to tell the difference between a dragonfly **larvae** and a water strider (a type of water bug). Because these tiny creatures need clean, oxygen rich water in which to live, their presence or absence in the pond ecosystem serves as an indicator of water quality. Finding these little animals in your sample will give you an indication of just how clean our pond water is. Macroinvertebrates can also serve as an **indicator** of the health of entire ecosystem because of their place in the **food chain**.

Questions and predictions to consider:

What do you think? Will you find any macroinvertebrates? Will our pond water be clean enough to support these creatures? How healthy is this ecosystem? Come dip in and find out!

Important vocabulary words to know and share:

ecosystem	A community of living organisms (biotic factors) interacting with each other and their physical environment (abiotic factors).
food chain	The connection between organisms based on their energy relationships with each other. The hierarchy of who eats whom.
indicator	A measure, trend, or fact that provides information about the state or level of something.
larvae	An immature form of an insect or other animal that undergo some metamorphosis to become an adult. (note: larvae is plural, larva is singular)
macroinvertebrate	An organism (often aquatic) without a backbone which can be seen with the naked eye.
sample	A small set or portion of something used to give information about the whole.

Write your predictions about this investigation in the space below:

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Activity description:

In this investigation, you will work in teams to compare the diversity, density, and abundance of plants at two different areas of the Preserve. You'll see when you get there that the wetland is located in a low spot of the property. Surrounding the wetlands are the higher, rolling hills. These higher areas are called the dry **uplands**. As you go downhill toward the pond, you'll notice a change in the vegetation (plants) until right at the water's edge, you'll see all kinds of water-loving plants. The area beside the wetlands (or any water course) is called the **riparian** area. The areas between the two are called the **transition zone**. In the transition zone, you'll see a mix of plants from both areas.

In your investigation, you'll mark off small study plots of one square meter (called a quadrat). In your quadrats, you will count the numbers of different kinds of plants (diversity) and the amount of ground covered by plants (density). You'll also note which plant occurs the most in your quadrat (abundance). You'll do the same study in an upland site and at a riparian site and compare the two.

Questions and predictions to consider:

What do you think you'll find? Will one area have more plant diversity than the other? Which area will have the most ground cover (the greatest plant density)? Will the same plants occur abundantly at both sites? Come do the Survey at the Cienega and find out!

Important vocabulary words to know and share:

abundance	The total or relative amount of something.
density	A measure of the amount of something in a given area.
diversity	The number of different kinds of something. A range of different things. Variety.
riparian	An area next to or including a wetland, river, or stream. Organisms that rely on such areas are considered to be "riparian species."
quadrat	A small area of habitat, typically of one square meter, selected at random to act as sample for surveying or assessing ecological conditions.
transition zone	An area located between two distinct habitats that contains characteristics of both its surrounding habitats. A transition zone exhibits a gradual change from one habitat to another.
uplands	The area of land that is higher in elevation (uphill from) a nearby wetland or riparian area. Upland soils are drier than wetlands which in turn influences the vegetation that occurs there.

Write your predictions about this investigation in the space below:

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Activity description:

In this investigation you will be looking at the seasonal changes of two different types of plants at the Preserve. As you know, seasons change throughout the year. As part of their **life cycle**, plants and animals respond to these seasonal changes: many trees drop their leaves in the fall and put forth new buds in the spring. Most plants produce flowers at a specific time of the year. Birds migrate, insects hatch, bears hibernate. Noting what plants and animals are doing is like an **indicator** of the season. The study of these seasonal changes in plants and animals is called **phenology**. In this study, you will investigate what is currently happening with two important plant **species** at the Preserve: the cottonwood tree and the oneseed juniper. You will carefully observe each plant and decide whether or not they are in bloom, have "fruits", or are dropping leaves. You'll enter your data on special data sheets and then submit that data to an on-line website using an iPad! This study is part of a national phenology study and your results will be shared with others around the country through the National Phenology Network. When this kind of information is collected over a long period of time (years and years) it can tell us a lot about environmental conditions such as the occurrence of **drought** or **climate change**.

Questions and predictions to consider:

What kinds of things do you think you'll find? Will the trees be changing color? Will they be blooming? How can we use phenology as an indicator of environmental change? What kinds of changes would we see over time that might indicate a warming climate? Come study the Seasons at the Cienega and find out!

Important vocabulary words to know and share:

climate change	A pattern of change affecting global or regional climate, as measured by such things as average temperature and rainfall, or a change in frequency of extreme weather conditions.
drought	A prolonged period of unusually low precipitation. A shortage of water usually results from this.
indicator	A measure, trend, or fact that provides information about the state or level of something.
life cycle	The stages of development that an organism goes through from egg (or seed) to adult and death.
phenology	The study of recurring plant and animal life cycle stages (such as leafing out, flowering, migration, etc.).
species	A group of organisms capable of reproducing to form fertile offspring.

Write your predictions about this investigation in the space below:

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Activity description:

In this investigation, you will be practicing your skills of observation to detect biotic and abiotic factors in the environment. Biotic factors are living things such as birds, mammals (including humans), and insects. Abiotic factors are the non-living environmental factors that make up the environment. Soil, air, water, and temperature are examples of abiotic factors. In fact, it is the abiotic factors that determine and influence what can live in an area. Think about an animal's habitat, that is, the place where it finds food, water and shelter in a suitable arrangement. The things it needs in its habitat for survival are both biotic and abiotic factors. The entire study of ecology comes down to scientists studying how living things interact with other living things and their environment. This activity will hone your skills for any ecological studies you do now or in the future. Similar to the exercise you did in class, you will have the chance to use all your senses to observe the different abiotic and biotic factors in the ecosystem around you. Once you've practiced your skills of observation, you'll work in pairs and compete to see which pair can detect the most biotic and abiotic factors. You'll be encouraged to use all your senses! This will be your chance to use your Senses at the Cienega!

Questions and predictions to consider:

What do you think? What kinds of abiotic factors do you expect to detect? What kinds of biotic factors will occur? Will you be more inclined to use all your senses or will you rely just on your sense of sight? How do you think the biotic factors you will detect are influenced by and reliant upon the abiotic factors? How will the weather influence this investigation? Do you expect to see any biotic factors interacting?

Important vocabulary words to know and share:

abiotic factors	The non-living physical and chemical conditions (such as temperature, moisture, climate, etc.) in an environment.
biotic factors	The living organisms (plants and animals) in an environment.
ecology	The study of the interactions of organisms with each other and their environment.
habitat	An area that includes all the necessities for an organism's survival. For animals this includes food, water and shelter in a suitable arrangement.

Write your predictions about this investigation in the space below:

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