Acorns to Oaks
Biodiversity Activity

LandSmart Objectives
Students will:
1. Conduct surveys to observe species diversity in a given area.

2. Calculate, compare, and analyze findings across multiple sites.

3. Discuss the effectiveness and constraints of the biodiversity survey activity.

4. Propose methods and criteria for developing a survey with greater accuracy.

LandSmart Goals
Students understand:
1. Oak trees, primarily Valley Oak, are a keystone species that provide essential ecosystem functions.

2. Changes in land use and management have resulted in the overall decline of oak woodland habitats, species richness, and diversity.

3. People can take actions to voluntarily steward natural resources in their own communities.

Next Generation Science Standards:
MS-LS2-5 Evaluate competing design solutions for maintaining biodiversity and ecosystem services.

DCI - LS2.C Biodiversity describes the variety opf species found in Earth's terrestrial and oceanic ecosystems. The completeness or integrity of an ecosystem's biodiversity is often used as a measure of its health.

"Oak woodlands are the most diverse terrestrial ecosystems in California, supporting at least 300 vertebrate species (including at least 120 mammal, 147 bird, 60 reptile and amphibian species), 1,100 plant species, 370 fungal species, and 5,000 arthropods species (insects and mites.)" (Napa Co. VOWMP 2010)

Biodiversity is a common tool used to understand and describe ecosystems. Valley oak trees are considered "Keystone Species" or a species that play a unique and crucial role in the structure and function of an ecosystem, and without which, the system would be dramatically different or cease to exist.

Warm-up Activity:

Students can survey a section of the school parking lot, counting total cars, and recording the make of each car. Divide the the total number of an individual make ("Toyota" for example) as the numerator, against the total number of cars in the parking lot. The result is the biodiversity index of the proportional presence of that particular "species" within a given "ecosystem" (parking lot.)

If you are unable to use the parking lot activity, 1 - 2 pages of a phone book white pages can be substituted for an in-class version. Count and compare the occurrences of last names against the total number of names found within 1 - 2 pages of a phone book, and calculate for "biodiversity" using names as species.

Instructions:
Form students into small groups and perform small scale survey areas. Use a hula hoop, or a piece of string tied into a 4' diameter loop to create the survey delineation tool. Bring teams to an open space area with plants and trees, and have students randomly choose an area to start their survey.

Emphasize students count the different types of plants found,and not to worry about the exact species name of what they are seeing.

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Instructions *(continued):*
This can be achieved by working on observation skills, each team member can be assigned one or two or more species to record and name - then describe and show to their team to begin the biodiversity count.

Once teams have defined the types of species, they should try their best to count as many individuals of each plant within their survey area. Things like grass and ground cover can be hard, so they can always count the number of blades in an even smaller space, and then estimate how many they think there are in the total space, which is essentially the point of the activity to begin with.

Record number of individuals of each species, calculate the sum total of all individuals of all species, then divide the species type count against the total sum.

$$\frac{\text{\# of species A observations}}{\text{Total \# of observations}} = \text{Species A Biodiversity Index}$$

Repeat procedure and calculate for all species observed, repeat in additional spaces if time allows.

Extensions:
- Observe for insects, students can dig into the soil, or survey tree branches by wrapping a garbage bag or bucket around a few branches and banging them into the bag or bucket.

- Observe for birds by sitting in place and watching for passing birds, or listening for their calls.

- What factors may affect species diversity? Are more species found near oak trees vs. landscaped areas? What other values do native oaks contribute to the ecosystem?

- How could this method be used to survey a whole forest?

For support contact Napa County RCD at (707)252-4189