

Biodiversity Lesson Plan 7

Plant Walk and Collection – Native vs. Non-Native

Teacher: Elena Martin

Grade Level: 9-12

Date: Summer 2016

AZ Science Standard:	<i>Strand 1: Inquiry Process; Concept 2: Scientific Testing, PO5: Record observations, notes, sketches, questions, and ideas using tools such as journals, charts, graphs, and computers.</i>
AZ College and Career Readiness Standards:	<p><i>9-10.RST.4. Determine the meaning of symbols, key terms and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9-10 texts and topics</i></p> <p><i>9-10.RST.3. Follow precise and complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.</i></p>
Enduring Understandings/ Essential Questions:	<p>Biodiversity (the variety of life on Earth): All Ecosystems contain a variety of life that is interdependent.</p> <p>How is biodiversity affected by human behavior?</p> <p>How does decreased/increased biodiversity affect life on Earth?</p> <p>How are humans dependent on biodiversity?</p>
Content Objective:	<i>Students will learn how to make a plant collection and how to identify native versus non-native plant species.</i>
Language Objective:	Students will use botanical words to label and describe plants and develop a descriptive vocabulary to help identify plants.

Vocabulary	Materials
Plant life forms; leaf structures	<ul style="list-style-type: none"> • <i>Desert Plant List</i> • <i>Plant collection homework assignment;</i> • <i>Field Journals and pen, Scissors, plants on school grounds, plant id book</i> • <i>Plant presses or Science Journal</i> • <i>“How to Make a Plant Press and Collection”</i> • <i>Plant Collection labels</i> • <i>Plant Life Form key</i> • <i>Powerpoint: Native versus Non-native plants</i> • <i>Previous years plant collections</i>

Seasonality: *Any time*

<i>Monsoon</i> July-Sept.	<i>Autumn</i> Oct.-Nov.	<i>Winter</i> Dec- Feb.	<i>Spring</i> Mar.-Apr.	<i>Dry Summer</i> May-June
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Guiding Questions:

How and why are plant collections made?

Which plants are native vs. non-native (invasive or cultivars)? What is the difference, and why does it matter? How many native plants do you have on your school campus, and what affect to they have on other forms of diversity?

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Anticipatory Set:

Ask students to reflect on the following question in their notes, discuss it with their neighbor, then prepare to respond: Why do scientists collect and identify living organisms?

Think-Pair-Share

Write your answer in your science journal. Share your idea with your neighbor and prepare to share with the class. Collect ideas on the board (may include everything from learning about biodiversity to studying climate change and evolution)

Activity 1: Native versus Non-Native (and Invasive) Plants

Tell students they will be learning how to make a native plant collection today. Students are to collect, press, identify and preserve 10-50 native desert plant specimens.

Show students examples of plant collections and discuss plant selection, arrangement, pressing, and identification (hand out guidelines for desert plant collection)

Give students the plant collections guidelines (below) and emphasize the following points

To learn how to select, collect, describe, press, and identify native desert plants for a plant collection.

Plant Collection Guidelines:

- Collect only NATIVE herbaceous plants
- Don't cut or press cactus or ocotillos! They don't press well and it damages them.
- Collect plants only if there are more than 10 in the area and are NOT RARE
- Avoid collecting in planted areas, unless you are sure they are native plants

Give students a plant label and discuss the categories on it and what they mean and how they will be practicing collecting this data today on the plant walk.

Give students the list of 50 common desert plants in Tucson/Arizona (**attached below**)

Ask them to circle the ones they think they know

Review the difference between native and non-native species, especially cultivars and invasives. Emphasize that their plant collection will only include native species. (powerpoint)

In their teams have them look up in books or online at least three invasive plant species in Arizona.

Extension: Have students make an invasive species "WANTED" poster for homework.

Activity 2: Plant Collecting

Take students out to school grounds and choose (if possible) several native and non-native desert plant species to examine. At the first few plants, show students how to cut a sample large enough to include identifiable features, but not so big it won't fit on a sheet of standard sized paper. If flowers and seedpods are present, include these in the collection.

At each plant students plan to collect, have them sketch and describe the whole plant (life form, height, location) and fill in the categories found on the plant label.

Working in pairs, have them collect and press the plant into their science journal, or collect the specimen in a bag to take back to the classroom to be pressed.

Plant Check-List

While exploring campus together or as teams, have students collect samples of native plants, take notes in their team journals and check off native or invasive plants on the plant check-list.

Return to the classroom with specimens.

Show students examples of non-native plants as plants NOT to put in their collection. Also show students a cactus and remind them not to try and press them either.

Activity 3: Show students how to press their plant using plant presses back in the classroom and give them time to press them.

Activity 5: Use keys, plant guides and online sources to identify plants collected by students at home and on the school grounds and fill out information on plant labels.

Extension Assignment: Invasive species poster attached

Closure Question:

Discuss with students where it would be best to collect native species, and ask them why they think native species might be important.

Plant Collection Project

Purpose: To learn how to select, collect, describe, press, and identify native desert plants for a plant collection.

Plant Collection Guidelines:

- Collect only NATIVE herbaceous plants
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- Collect plants only if there are more than 10 in the area and are NOT RARE
- Avoid collecting in planted areas, unless you are sure they are native plants

Category and point value	Points earned	Comments
_____ Native plants 1 point each		
Correct labeling and mounting technique 0.5 point each		
Aesthetic pressing 0.5 point each		
Correct Family 1 point each		
Correct Genus species 1 point each		
Plant collection finished Dec 4		
Total points 200 points		

Plant Collection due dates (_____ single; _____ with partner)

First 5 plants due: _____

Final plant collection due: _____

Plant Biodiversity Survey

Common Native and Non-Native Desert Plant Search List, Tucson, AZ

(From "Plants of the Desert: Running Plant list. By Dick Barber, University of Arizona)

Names: _____ Period _____

Location: _____ Date _____

Note: Let the treasure hunt begin! Below you will find a list of native desert plants, as well as some NON-native plants that might be found in your school or backyard in Tucson. Some of these plants CHECK THE BOX if you find them in your search – see how many you can find!

TREES	COMMON NAME	SCIENTIFIC NAME	HABITAT
<input type="checkbox"/>	Arizona (Velvet) Ash	<i>Fraxinus velutina</i>	Riparian
<input type="checkbox"/>	Arizona Black Walnut	<i>Juglans major</i>	Riparian
<input type="checkbox"/>	Cottonwood	<i>Populus fremontii</i>	Riparian
<input type="checkbox"/>	Desert Willow	<i>Chilopsis linearis</i>	Riparian
<input type="checkbox"/>	Feather tree	<i>Lysoloma microphylla</i>	Riparian, endemic
<input type="checkbox"/>	Ironwood	<i>Olneya tesota</i>	Desert
<input type="checkbox"/>	Mesquite, Velvet	<i>Prosopis velutina</i>	Desert
<input type="checkbox"/>	Netleaf Hackberry	<i>Celtis reticulata</i>	Riparian
<input type="checkbox"/>	Palo Verde, Blue	<i>Cercidium floridum</i>	Desert
<input type="checkbox"/>	Palo Verde, Foothills	<i>Cercidium microphyllum</i>	Desert
<input type="checkbox"/>	Palo Verde, Mexican	<i>Parkinsonia aculeata</i>	Desert, introduced
<input type="checkbox"/>	Sycamore	<i>Platanus wrightii</i>	Riparian
<input type="checkbox"/>	Western Black Willow	<i>Salix gooddingii</i>	Riparian
SHRUBS			
<input type="checkbox"/>	Agave	<i>Agave sp.</i>	Desert
<input type="checkbox"/>	Beargrass	<i>Nolina microcarpa</i>	Desert/upland
<input type="checkbox"/>	Brickellia	<i>Brickellia sp.</i>	Desert
<input type="checkbox"/>	Brittlebush	<i>Encina farinose</i>	Desert
<input type="checkbox"/>	Burrowweed	<i>Isocoma tenuisecta</i>	Desert
<input type="checkbox"/>	Burrobrush	<i>Ambrosia (Hymenoclea) salsola</i>	Desert
<input type="checkbox"/>	Canyon Ragweed	<i>Ambrosia ambrosioides</i>	Desert/Riparian
<input type="checkbox"/>	Catclaw Acacia	<i>Acacia greggii</i>	Desert
<input type="checkbox"/>	Condalia	<i>Condalia warnockii</i>	Desert
<input type="checkbox"/>	Creosote	<i>Larrea tridentate</i>	Desert
<input type="checkbox"/>	Desert Broom	<i>Baccharis sarathoides</i>	Desert
<input type="checkbox"/>	Desert Hackberry	<i>Celtis pallida</i>	Riparian
<input type="checkbox"/>	Desert Lavender	<i>Hyptis emoryi</i>	Desert Riparian
<input type="checkbox"/>	Desert Mistletoe	<i>Phoradendron californicum</i>	Parasite
<input type="checkbox"/>	Ephedra	<i>Ephedra trifurca</i>	Desert
<input type="checkbox"/>	Fairyduster	<i>Calliandra eriophylla</i>	Desert
<input type="checkbox"/>	Graythorn	<i>Zizphus obtusifolia</i>	Desert

SHRUBS	COMMON NAME	SCIENTIFIC NAME	HABITAT
<input type="checkbox"/>	Hopbush	<i>Dodonaea viscosa</i>	Desert
<input type="checkbox"/>	Jojoba	<i>Simmondsia chinensi</i>	Desert
<input type="checkbox"/>	Koeberlinia	<i>Koeberlinia spinosa</i>	Desert
<input type="checkbox"/>	Krameria, White Ratany	<i>Krameria grayi</i>	Desert
<input type="checkbox"/>	Limberbush	<i>Jatropha cardiophylla</i>	Desert
<input type="checkbox"/>	Lippia/Beebush	<i>Aloysia wrightii</i>	Desert
<input type="checkbox"/>	Mariola	<i>Parthenium confertu (incanum)</i>	Desert
<input type="checkbox"/>	Ocotillo	<i>Foqueria splendans</i>	Desert
<input type="checkbox"/>	Red Bird of Paradise	<i>Caesalpina Mexicana</i>	Desert, chihuahua
<input type="checkbox"/>	Saltbush	<i>Atriplex canescens</i>	Desert
<input type="checkbox"/>	Seepwillow	<i>Baccharis glutinosa</i>	Riparian
<input type="checkbox"/>	Sotol	<i>Dasyilirion wheeleri</i>	Desert
<input type="checkbox"/>	Stephanomeria	<i>Stephanomeria exigua</i>	Desert
<input type="checkbox"/>	Sweetbush	<i>Bebbia juncia</i>	Desert
<input type="checkbox"/>	Tecoma stans	<i>Tecoma stans</i>	Riparian
<input type="checkbox"/>	Texas Ranger	<i>Leucophyllum spp</i>	Desert, Chihuahuan
<input type="checkbox"/>	Trixis	<i>Trixis californica</i>	Desert
<input type="checkbox"/>	Tree Tobacco	<i>Nicotania glauca</i>	Desert
<input type="checkbox"/>	Triangle-leaf Bursage	<i>Ambrosia deltoidia</i>	Desert
<input type="checkbox"/>	Whitethorn Acacia	<i>Acacia constricta</i>	Desert
<input type="checkbox"/>	Wolfberry	<i>Lycium spp (need flowers to key out)</i>	
<input type="checkbox"/>	Yellow Bird of Paradise	<i>Caesalpinia gilliesii</i>	Desert
	Yucca		
<input type="checkbox"/>	Banana Yucca	<i>Yucca baccata</i>	Desert
<input type="checkbox"/>	Soaptree Yucca	<i>Yucca elata</i>	Desert
<input type="checkbox"/>	Schotts's Yucca	<i>Yucca Schotii</i>	Desert

LOW SHRUBS AND BUSHES

<input type="checkbox"/>	Cassia	<i>Senna covesii</i>	Australia, cultivar
<input type="checkbox"/>	Datura	<i>Datura metelodies</i>	Riparian
<input type="checkbox"/>	Desert Marigold	<i>Baileya multiradiata</i>	Desert
<input type="checkbox"/>	Desert Tobacco	<i>Nicotina trigonophylla</i>	Desert
<input type="checkbox"/>	Desert Zinnia	<i>Zinnia acerosa</i>	Desert
<input type="checkbox"/>	Dyssodia	<i>Dyssodia acerosa</i>	Desert
<input type="checkbox"/>	Janusia	<i>Janusia gracilis</i>	Desert

LOW SHRUBS AND BUSHES, cont'd

	COMMON NAME	SCIENTIFIC NAME	HABITAT
	Mallows	<i>Sphaeralcea spp.</i>	Desert
<input type="checkbox"/>	Globe Mallow	<i>Sphaeralcea ambigua</i>	Desert
<input type="checkbox"/>	Herissanthia	<i>Herissanthia crispa</i>	Desert
<input type="checkbox"/>	Indian Mallow	<i>Abutilon sp.</i>	Desert
<input type="checkbox"/>	Rose Mallow	<i>Hibiscus sp.</i>	Desert
<input type="checkbox"/>	Penstemon	<i>Penstemon spp.</i>	Desert
<input type="checkbox"/>	Snakeweed	<i>Gutierrezia sarothrae</i>	Desert
<input type="checkbox"/>	Siphonoglossa	<i>Siphonoglossa longiflora</i>	Desert
	Verbena		
<input type="checkbox"/>	Gooding's (Desert)	<i>Glandularia goodingi</i>	Desert, washes
<input type="checkbox"/>	Sand	<i>Abronia villosa</i>	Desert, washes
<input type="checkbox"/>	Wright's	<i>Glandularia wrightii</i>	Desert
<input type="checkbox"/>	Yellow Paperflower	<i>Psilostrophe cooperi</i>	Desert

SOME SUMMER ANNUAL FLOWERS/WEEDS

<input type="checkbox"/>	Bahia	<i>Bahia absinthifolia</i>	Desert
<input type="checkbox"/>	Caltrop	<i>Kalistroemia grandiflora</i>	Desert
<input type="checkbox"/>	Clammyweed	<i>Polanisia dodecandra</i>	Desert
<input type="checkbox"/>	Crownbeard	<i>Verbesina enceliodes</i>	Desert
<input type="checkbox"/>	Devil's Claw	<i>Proboscidea parviflora</i>	Desert
<input type="checkbox"/>	Euphorbs	<i>Euphorbia spp.</i>	Desert
<input type="checkbox"/>	Five-fingered Gourd	<i>Curcubita digitata</i>	Desert
<input type="checkbox"/>	Horseweed	<i>Conyza canadensis</i>	Desert
<input type="checkbox"/>	Senecia	<i>Senecio spp.</i>	Desert
<input type="checkbox"/>	Sunflower	<i>Helianthus annuus</i>	Desert

CACTI (Family Cactacea)

<input type="checkbox"/>	Barrel Cactus	<i>Ferocactus fulgida</i>	Desert
<input type="checkbox"/>	Jumping Cholla	<i>Cylindrapuntia (opuntia) fulgida</i>	
<input type="checkbox"/>	Cane/Staghorn Cholla	<i>Cylindrapuntia acanthocarpa/versicolor</i>	
<input type="checkbox"/>	Christmas Cholla	<i>Cylindrapuntia leptocactus</i>	Desert
<input type="checkbox"/>	Pencil Cholla	<i>Cylindrapuntia arbuscula</i>	Desert
<input type="checkbox"/>	Teddy Bear Cholla	<i>Cylindrapuntia bigellovii</i>	Desert
<input type="checkbox"/>	Hedgehog, Strawberry	<i>Echinocerus engelmannii</i>	Desert, upland
<input type="checkbox"/>	Hedgehog, Pinkflower	<i>Echinocerus fasciculatus</i>	Desert, upland
<input type="checkbox"/>	Night-blooming cereus	<i>Peniocereus spp.</i>	Desert
<input type="checkbox"/>	Organpipe	<i>Cereus thurberii</i>	Desert
<input type="checkbox"/>	Pincushion	<i>Mammillaria microcarpa</i>	Desert
<input type="checkbox"/>	Prickly Pear	<i>Opuntia spp</i>	Desert
<input type="checkbox"/>	Saguaro	<i>Carnegia gigantean</i>	Desert

SOME INVASIVE DESERT SPECIES

	COMMON NAME	SCIENTIFIC NAME	ORIGIN
GRASSES			
<input type="checkbox"/>	Buffelgrass	<i>Pennisetum ciliare</i>	Africa, Asia, M. East
<input type="checkbox"/>	Burmuda grass	<i>Cynodon dactylon</i>	Middle East
<input type="checkbox"/>	Cheatgrass	<i>Bromus tectorum</i>	Eurasia
<input type="checkbox"/>	Fountain grass	<i>Pennisetum setaceum</i>	Africa, Asia
<input type="checkbox"/>	Nutgrass	<i>Cyperus rotundus</i>	Eurasia, Africa
<input type="checkbox"/>	Red Brome	<i>Bromus rubens</i>	Eurasia
FORBS			
<input type="checkbox"/>	African (Sahara) mustard	<i>Brassica tournefortii</i>	Africa
<input type="checkbox"/>	Diffuse Knapweed	<i>Centaurea diffusa</i>	Eurasia
<input type="checkbox"/>	London Rocket	<i>Sisymbrium irio</i>	Eurasia
<input type="checkbox"/>	Malta starthistle	<i>Centaurea meletensis</i>	Mediterranean
<input type="checkbox"/>	Puncture Vine (Goat Head)	<i>Tribulus terrestris</i>	Invasive, Eurasia
<input type="checkbox"/>	Tumbleweed	<i>Salsola iberica</i>	Russia
<input type="checkbox"/>	Velvetweed	<i>Guara mollis</i>	Asia
TREES/SHRUBS			
<input type="checkbox"/>	African sumac	<i>Rhus lancea</i>	South Africa
<input type="checkbox"/>	Athel Tamarisk	<i>Tamarix aphylla</i>	Eurasia, Africa
<input type="checkbox"/>	Saltcedar	<i>Tamarix parviflora</i>	Eurasia, Africa