

Diversity of Life Field Trip Guide

Teacher/Chaperone

ARIZONA-SONORA
DESERT
MUSEUM



This field trip was designed as an exploratory activity with a slight emphasis on content development and should be utilized at the beginning of the Diversity of Life unit. It is recommended that students complete the first part of Investigation 1 from the Diversity of Life Unit: "What is Life" (through sorting the living/non-living cards) prior to visiting the Desert Museum.

Materials:

Copies of Teacher/Chaperone Guide for all leaders
Copies of Student Guide for all students or student groups
Clipboards (if available)
Pencils or pens
Compass (if available)

Activities during the visit

All Students will do the following, in any order, located in the Southeast quadrant of the Museum:

1. Tour the Saguaro Cactus Exhibit adjacent to the Big Horn sheep exhibit; when you return to the Museum exit, complete a sketch of a 75 + year old Saguaro from the Museum steps.
2. Investigate the Life Zones exhibit outside the walk-in Aviary;
3. Visit the Thornscrub Community, located along the walkway between the Ironwood Restaurant and the walk-in Aviary

Each chaperone/student group will be assigned to become experts in one of the following:

1. Cat Canyon
2. Riparian Corridor
3. Mountain Woodlands
4. Desert Grasslands
5. Aviary/Hummingbird
6. AZ Upland (Desert Loop) -- Requires lots of walking in open desert --- Best done in a.m.!

Upon completion of 1, 2, 3 & 4 and one Expert assignment, chaperone/student groups may choose to visit any of the Expert locations 1 through 6 and/or other Museum exhibits and interpretive stations.

(Due to class size variances and/or teacher preferences, some of the topics may not be assigned to an expert group and they can be investigated during choice time.)

OPTIONAL

The Desert Museum offers a “*Drawing Desert Life*” Program that fits wonderfully into the Diversity of Life curriculum and this field trip. The program is designed to assist students in gaining practice with Scientific sketches and drawings. Students are instructed how to diagram a living animal. The program is 40-50 min long and allows up to 30 participants per presentation (check Desert Museum web site for scheduling/additional fee information). The teacher would have to rotate students between the Program and the outside activities during the visit.

TIME Estimate

3 – 4 hours at the Desert Museum

STANDARDS:

AZ Standards DOL: Strand 4 Life science: Concept 1: Understand the relationships between structures and functions of organisms.

Strand 2 History and Nature of Science: Concept 2: Understand how science is a process for generating knowledge.

Strand 1 Inquiry Process: Concept 1: Formulate predictions, questions, or hypotheses based on observations. Locate appropriate resources

21st Century Standards:

Crosscutting Concepts: Cause/Effect, Structure/Function, Energy and matter

Life Sciences: Ecosystem interactions, Biological unity and diversity

Scientific Practices: Obtaining, Evaluating, and Communication information

Enduring Understandings: (Diversity Of Life)

- ✓ Living things need appropriate environments to survive
- ✓ Living things are highly diverse: there are millions of species of plants and animals
- ✓ Water is the basis of life on Earth
- ✓ The structures present in living things are related to the functions performed by those structures
- ✓ Living things have definite characteristics that distinguish them from non-living things

Mandatory Stop 1: Saguaro Cactus Exhibit Key

(Located in the wall adjacent to the Big Horn Sheep exhibit)

1. What 'needs' of the saguaro cactus are met by the following:

a Growing near a nurse plant? Responses will vary -
Protection from the sun, cold, and animals

b Germinating and growing in rocky soil? Responses will vary -
Protection from sun and animals

c.) Only growing in the Sonoran Desert? Responses will vary -
Temperatures above freezing and sufficient amount of rainfall

2. How does each of the following structures of a Saguaro help it meet its needs to maintain life?
 Responses will vary -

Structure	Function (How helps saguaro maintain life)
Roots	Extensive, shallow system – stretches in all directions – Collect water
Exterior	Waterproof (restricts water loss); expands & contracts for water storage
Framework	12–30 internal wood ribs provide structure/support mass of up to 10 tons

3. Explain the inter-relationship between the woodpeckers and the saguaro. _____

Responses will vary - Commensalism = relationship that benefits one partner; but causes
neither harm nor benefit to the other

4. How does the structure of a woodpecker's beak relate to its function(s)? _____

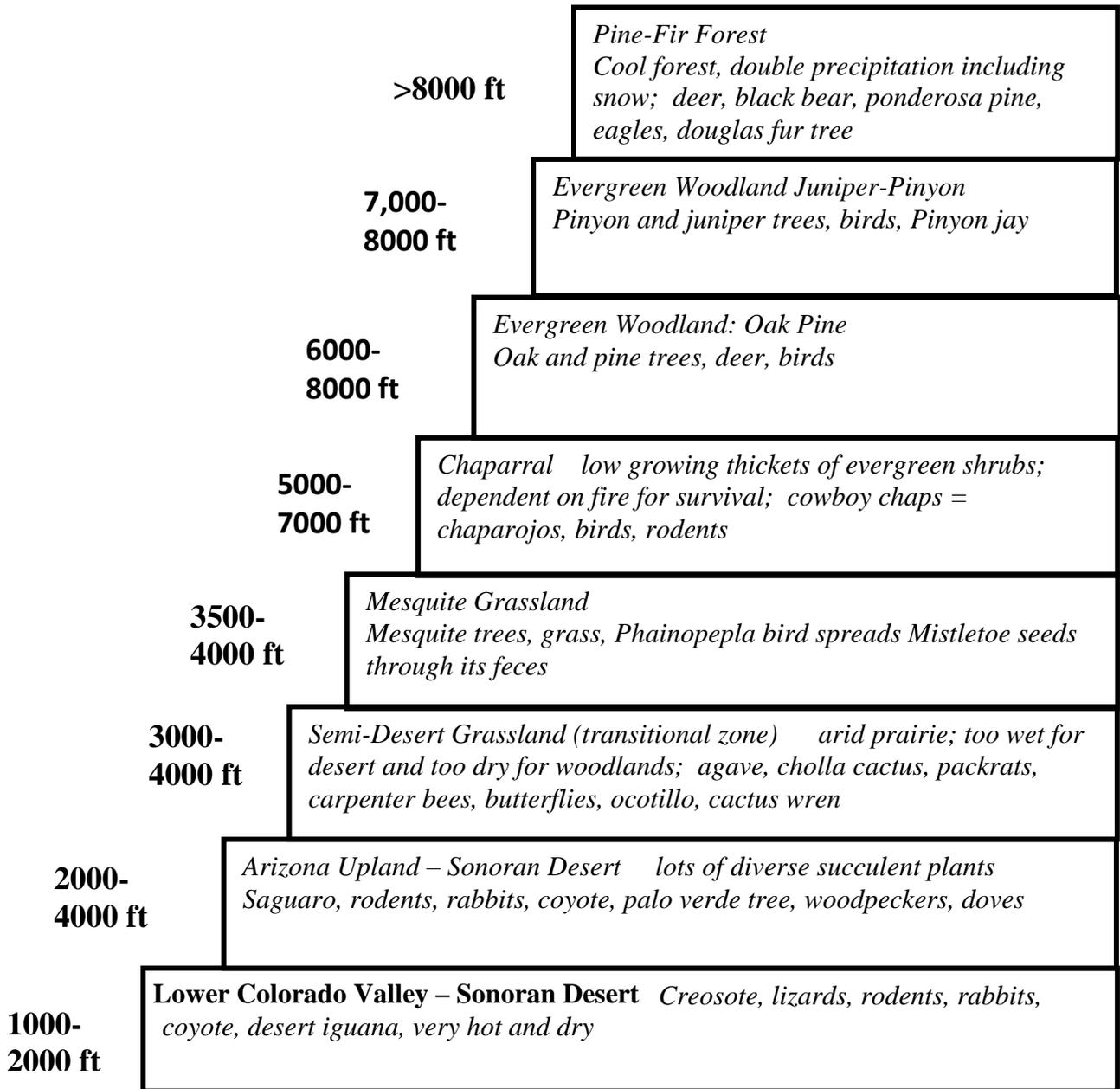
Responses will vary - Beak needs to be long & strong to bore through the exterior of cactus

5. How is the abandoned woodpecker nest further utilized? Responses will vary -

Used as a secondary nest by other bird species, such as the White-winged Dove

MANDATORY STOP 2: LIFE ZONES – KEY (facing the Aviary door, look behind you over your right shoulder for first sign)

In 200 feet of this exhibit, you can imagine that you are walking to the top of a 9000-foot mountain. Compare/contrast the different biotic regions or life zones. Using the exhibit signs, label each ascending life zone, list an interesting fact, note precipitation, and identify at least one plant and one animal found in each region. Please note: the zones are approximate, and have been moving up in elevation since this exhibit was constructed.



Using what you have learned, describe the relationship between elevation, temperature, and the types of plants found as you ascended the 'mountain'

As you go up the mountain, temperatures drop and precipitation increases. The plants at higher elevations require more water and are more cold tolerant.

Why do you think the life zones have moved up the mountain over the last decades?

Due to climate change, temperatures have been increasing at all elevations, causing plant communities to move up in elevation.

MANDATORY STOP 3: Thornscrub Community Key

(located along the walkway between the Ironwood Restaurant and the walk-in Aviary)

Observe the plants. Make notations as you discover patterns and the diversity.

Responses will vary -

Describe the pattern you see with the barrel cactus. What direction do you think they are pointing? The closest mountains (Tucson mountains) are to the East. You can also use a compass if you have one, and your knowledge of the Sun's movement in the sky south.

Hypothesize why they have directionality Responses will vary -

Locate the crested Saguaro (cactus with a crown). Make a quick sketch of the crested Saguaro.

Locate the nurse plant that is protecting the greatest number of Saguaros. What type of tree or shrub is it? Desert Ironwood OR Palo Verde; and the number of Saguaros under it? can vary – there's one with 3 saquaros under it.

EXPERT GROUP: Hummingbird and Walk-In Aviaries –Key

Prior to entering the Hummingbird Aviary (along the path leading to the Hummingbird Aviary), locate and read the information about the Ocotillo and the Hummingbird.

1. Describe the relationship between the Ocotillo and the Hummingbird. _____
Responses will vary - Hummingbirds = pollinators for the Ocotillo

2. As you enter the hummingbird aviary, stop and notice the physical surroundings. Describe the physical environment and predict its importance to the hummingbird’s survival: Responses will vary -
Cooler temperature & increased humidity plus tall & ground cover vegetation for nutrients

3. For the season you are visiting the Desert Museum, list the hummingbirds that are present in the aviary. Responses will vary -

4. Locate and record the following data for a hummingbird:

Heart rate	<i>Blue Throated = 1,260/minute</i>	Energy Requirements	<i>Anna = 8-10 calories/daily from 1,000 flowers/water</i>
Weight	<i>Calliope = 2 ½ grams</i>	How conserve Energy	<i>Heart rate & body temp go down at night</i>
Wing beats	<i>Costa = 80/second</i>	Eggs	<i>Size of a navy bean</i>

5. If a hummingbird were as big as you, what would it have to do to stay alive? _____
Responses will vary- consume 300 lbs of food and 150 gal of water

6. Sit and observe the hummingbirds. What are some of the various feather colorings and behaviors that you see? Responses will vary -

7. Make a hypothesis about why their colorings are different. Responses will vary -

8. What analogy can you make: a) for the hummingbird’s beak: Responses will vary(needle)
 b) for the hummingbird in flight: Responses will vary (hover)

9. See if you can locate a hummingbird nest. If you can, sketch it and/or make observations about how it is constructed.

10. Choose one hummingbird to sketch noting its special colorings. Then find the ID charts and see if you can identify it by name.

The name of my hummingbird is: Responses will vary -

Interesting facts about my hummingbird are: Responses will vary-

11. Would you say that hummingbirds are aggressive? _____ Defend your answer. _____

Responses will vary -

12. Prior to entering the Walk-In Aviary, view the variety of birds pictured on the wall. How many species migrate/reside in the Tucson area? 400 species

13. Make a prediction about how birds sleep (not hanging upside down)? _____

14. Observe several birds in flight. Compare their flight patterns with that of the hummingbird.

Responses will vary -

15. Sit and observe different birds. What are some of the various feather colorings, beak shapes and behaviors that you observe? Responses will vary -

16. How would you explain the differences in the shapes of the beaks of birds? _____

Responses will vary -

17. See if you can find a bird's nest. Sketch and/or make observations about its construction.

EXPERT GROUP: Bighorn Sheep/Cat Canyon – Key

As you observe the animals in these exhibits, compare/contrast their typical diets and habitats (homes), note interesting facts, and describe interesting features of their exterior, body characteristics. Make inferences as to why their exterior bodies have these characteristics (how do they help them meet their needs to stay alive).

Animal	Typical diet	Describe Physical environment	Den Y/N	Interesting fact (s)	Exterior Body characteristics	Inferences
Big horned Sheep	<i>Herbivore Grazing grasses</i>	<i>Rocky – Open Body of water Vegetation</i>	<i>No</i>	<i>Ability to climb and descend steep, rocky surfaces</i>	<i>Large antler/horns Brown/beige body fur w. white rump</i>	
Ocelot	<i>Carnivore Small mammals Birds & turkeys</i>	<i>Rocky – Open With crevices Vegetation</i>	<i>Yes</i>	<i>Spend much time in Trees – Heavily Hunted for skins/fur</i>	<i>Light colored fur With dark spots Forward face eyes</i>	
Bobcat	<i>Carnivore Rabbits, birds, Rodents</i>	<i>Rocky – Open With crevices Vegetation</i>	<i>Yes</i>	<i>Resides low desert To high mountains Solitary</i>	<i>Light brown fur w. dark markings Bobbed tail</i>	
Gray fox	<i>Omnivore Berries & nuts Small mammals</i>	<i>Rocky – Open with crevices Vegetation</i>	<i>Yes</i>	<i>Arboreal Nocturnal Canine family</i>	<i>Light gray fur with Black guard hairs</i>	
Coati	<i>Omnivore Berries & acorns Insects & lizards</i>	<i>Open area with rocky shelter Vegetation</i>	<i>Yes</i>	<i>Raccoon family Nocturnal</i>	<i>Various shades of Brown fur Very long tails</i>	
Porcupine	<i>Herbivore Bark and Fruit</i>	<i>Rocky Vegetation Riparian</i>	<i>Yes</i>	<i>Large Rodent Nocturnal Arboreal</i>	<i>Body covered in Quills – made of Keratin (fingernail)</i>	

1. Locate and summarize the definition of Ecology: *The study of the inter-relationships between plants and animals and the environment*

2. Hypothesize why all of these animals are able to co-exist in the same area. *Responses will vary - They require varying resources for food and utilize different habitats*

3. Using what you have learned, bust a myth pertaining to porcupines. *Responses will vary - Quills are not thrown – Direct contact is required*

4. Describe how the structure of the cat ‘claws’ are related to their function (how used). *Responses will vary Sharp to catch & kill prey and retractable so that they can walk on paw pads and keep the claws from dulling*

5. Predict why some of these animals have dens. *Responses will vary - Protection, Shelter, Raise young, Keep cool in summer, nocturnal*

6. Make a sketch of one of the animals. Optional

EXPERT GROUP: Desert Loop (AZ Uplands) - Key

(This is a half-mile trail, with part of the trail uphill. It takes about ½ to 1 hour to tour.)

You will pass the Saguaro Ramada and along side the trail will be a sign for the **Ocotillo**.

1. Compare the water conserving features of the Ocotillo with the Human uses.

Ocotillo feature	Human use
<i>Waxy substance</i>	<i>Leather softener</i>
<i>Gum</i>	<i>Thickener & adhesive</i>
<i>Resin</i>	<i>Waterproofing</i>

2. If you encounter the **Chuckwalla** and the **Eastern Collared Lizard** at the same time, what characteristics would you use to identify each of them? Responses will vary -

Chuckwalla – Body: 5-9”, plump to fat appearance, blunt tipped tail, 6 eggs laid, herbivore
E. Collared Lizard – Large head, body: 3-4”, tail 10”, 2 black collars around neck, carnivore

3. The Chuckwalla and the Eastern Collared Lizard have different ways of surviving in the desert. Describe 2-3 of these differences: Responses will vary -

Chuckwalla – Herbivore, rock lover, response to predator = seeks shelter & puffs up
E. Collared Lizard – Carnivore, fast runner, response to predator = head bobbing & push ups

4. Explain 3 or 4 main differences between a javelina and a pig: Responses will vary -

Javelina	Pig
<i>Originated in Western Hemisphere</i>	<i>Originated in Eastern Hemisphere</i>
<i>Scent gland near base of tail</i>	<i>No scent gland</i>
<i>Have a tiny tail</i>	<i>Usually have a long tail</i>
<i>Wild</i>	<i>Domesticated (& some wild)</i>

5. How does the structure of the javelina’s canine teeth correlate to their function? _____
Responses will vary - Sharpen as mouth opens and closes so that canines are razor sharp

6. After reading about the javelina’s senses, assess which sense will help the javelina detect your presence first. Sense of smell

7. Javelinas travel in groups; why is this to their advantage? Responses will vary -
Protection, greater chance for locating water & food, and snuggle to keep warm in cold temperatures

If you are lucky enough to view the Javelina, record your observations about its appearance and/or behavior.

Responses will vary -

8. There are 3 main types of Palo Verde trees common in the Tucson desert area. Name and briefly sketch a branch of each type, making sure differences are notable. *Order may vary - -*

<p><i>Blue Palo Verde</i></p> <p><i>Flexible, large leaflets</i></p>	<p><i>Foothills Palo Verde</i></p> <p><i>Tiny leaflets</i></p>	<p><i>Mexican Palo Verde</i></p> <p><i>Long, weeping needlelike</i></p>
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9. Coyotes exhibit opportunism. Describe what this means: *Responses will vary - Omnivore – flexible, eat what is available, adapt to water source and shelter available*

10. What characteristic(s) of the coyote were used to make the conclusion that the coyote exhibits opportunism? *Responses will vary - Adapt and survive/thrive in various environments*

11. If you were to observe a coyote, what characteristics contribute to its success as a predator? *Responses will vary -*

EXPERT GROUP: GRASSLANDS - KEY

1. (This animal is on exhibit during warm seasons only) It's not a box! It's a Desert
Box Turtle.

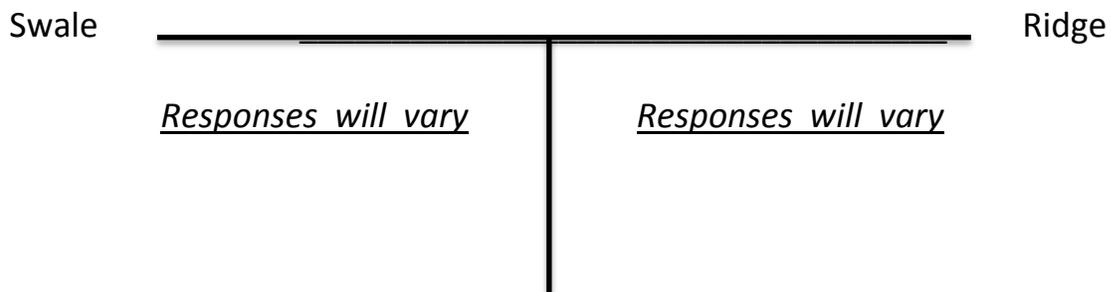
2. How does the structure of the shell function to provide protection? _____
student responses vary – example may be: hard and closes for protection

3. Identify the animal that was common to the Grasslands prior to domestication
for man's work and pleasure: the horse

4. Grasses feed the world. Do you agree yes Support your response with
data. See grain data display

5. Identify the main, physical differences between a swale community and a ridge
community: Student responses vary – swale is low & moist vs. ridge is high & dry

6. Compare and Contrast one of the 4 swale community snakes with one of the 3 ridge
community snakes. Identify each snake used.



7. Which grassland animals are geniuses at running mazes? Kangaroo rat

8. How does this animal obtain its water? Responses will vary
It extracts it from seeds and other foods

9. Describe commensalism Responses will vary - two organisms exist

together when 1 benefits and the other does not benefit/suffer from the other

10. Who borrows burrows from the prairie dog? _____

And why? _____

11. Who was last seen in Arizona in the 1930's! Prairie dogs

12. Describe a coterie and why it is beneficial? Responses will vary

Family - Social & Protection

13. View the prairie dogs for 5 minutes. Identify 5 observable personification behaviors (animals exhibiting human-like emotions/actions).

1. _____
2. _____
3. _____
4. _____
5. _____

Responses will vary

14. Describe how some of the Grassland living organisms obtain the necessary nutrients/resources to maintain life.

Responses will vary

15. Prairie dog sketches - Optional

EXPERT GROUP: Tortoise & Riparian Corridor – Key
(Tortoises will not be on exhibit during cooler months, from approximately October through April, but students can get information from exhibit signs)

1. Describe how a tortoise is different from a turtle. Responses will vary -
Tortoise specialized to be on land vs. turtles in water

2. Compare the shape of the tortoise front legs to its hind legs. Responses will vary -
Front legs are flattened vs. rear legs are cylindrical

3. Hypothesize why there is a difference. Responses will vary -

4. How does the tortoise meet its needs for nutrients and water? Responses will vary -
Water from its varied herbivore diet

5. The Riparian Corridor is a very distinct biotic community within the Sonoran Desert. What is the major defining characteristic of the physical environment of the Riparian Corridor?
Responses will vary - Water running through it

6. Make 4-5 **scientific** observations about the Riparian physical environment: _____
Responses will vary -

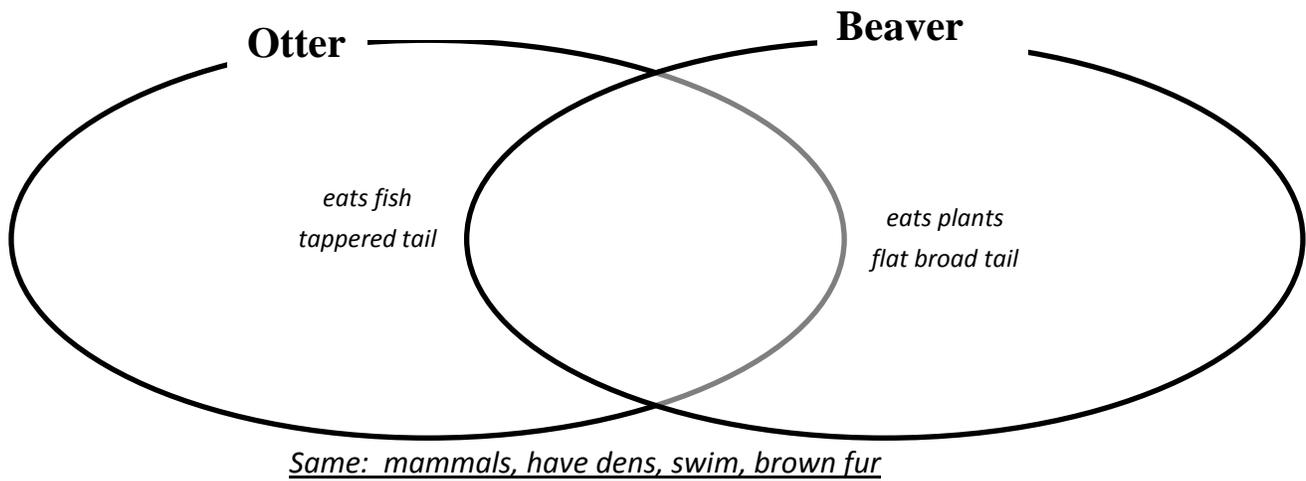
7. Suppose this area undergoes a drought for several years. Hypothesize what would happen to the Riparian community and justify your answer. Responses will vary -

8. Would you consider our 'washes' during Monsoon season to be Riparian areas? _____
Why or why not? Responses will vary -

9. Find and list 3 species of fish native to the Sonoran Desert region: Sinaloan cichlid,
Speckled Dace, Gila Topminnow, Desert pupfish, Bonytail chub

10. Fish is the food source for which animal(s) shown in the exhibit: _____

11. Observe, then compare/contrast the beaver and the otter (list at least 5)



12. Hypothesize how the structure (shape) of these animals allow them to function under-water. Responses will vary -

13. Make a detailed sketch below of either the beaver or the otter, your choice.

EXPERT GROUP: Mountain Woodlands - Key

1. View the Mountain Lion from both the upper and lower observation stations. As you walk from one station to the other, observe and listen to your surroundings. Describe the physical features and vegetation (type, height, etc.) that you see and the natural sound you hear.

Responses will vary Trees and lower vegetation have leaves; deciduous

Sound of waterfall

2. Describe the typical weather conditions of the Mountain Woodlands Responses will vary

Moderate air temperatures (cooler than Tucson) and more humidity (than Tucson)

3. The mountain lion has a hunting range of up to 200 sq miles.

4. Identify the four physical characteristics that allow the mountain lion to be a successful hunter:
Responses will vary

1. forward facing eyes 2. large, retractable claws

3. powerful jaw 4. long, pointed canine teeth

5. Black Bears have a weight range of 200 to 300 pounds.

6. Are all black bears black? No Hypothesize why this would be

Responses will vary - genetics

7. The Mexican Grey Wolf has a hunting range of up to 30 miles.

8. What caused the Mexican Grey Wolf to become endangered? Responses will vary

Cattle ranchers eliminated as believed wolves were destroying their herds

9. White-tail deer are herbivores that consume Responses will vary – Twigs and leaves.

Explain why the white-tail deer 'hides' during the day. Responses will vary – In order to avoid

detection

10. What are the common characteristics of the Mountain Woodlands habitats of the mountain lion, black bear, Mexican grey wolf and white-tail deer? _____

Responses will vary – Temperate climate (moderate/cool temperatures plus humidity), exposed

rock enclosures, and tall, broad-leafed trees and ground cover vegetation

11. Identify 3 birds common to the Mountain Woodlands: 1. Broad-beaked Parrot

2. Kestrel

3. Currently – Scrub Jay

12. Discuss how the animals obtain the resources they require for survival within the Mountain Woodlands:

Responses will vary - Hunt for prey and/or graze/forage - Pools of water

- Crevices for shelter and to hide - Rocky terrain

13. Sketch an animal from this region - Optional

DOCENT INTERPRETATION

Be sure to listen to a docent interpretation. Docents are found throughout the Museum and have interesting desert artifacts, and sometimes live animals to show you! With your chaperone, check the events schedule at the Orientation Ramada and decide which interpretations you want to see. Write down the time and location so you don't forget!

Use the space below to take some notes. When you return to your classroom, write a paragraph about what you learned.

Docent interpretation subject: _____

Notes: _____



FAVORITE EXHIBITS



1) Which exhibit or part of the Museum did you enjoy the most? _____

2) Why did you find this so interesting? _____
