

## Playa Food Web - Teacher's Guide

### Abstract

Students learn about the natural history of plants and animals that live in desert playas, temporary lakes that fill with water after large rainstorms. They use this information to construct a playa food web. Students observe some of these food web relationships in action in a mini playa in the classroom.

**Grade level:** 5<sup>th</sup> grade

### Duration and Teacher Preparation

Preparation – 10 minutes

Two or more days before the lesson begins, put approximately 1 gallon of tap water in a pitcher or bucket and let it sit out. This helps eliminate chlorine in the water that may be detrimental to the playa ecosystem.

Part 1 – (50 minutes) constructing food web and setting up mini playa

Part 2 – (10 minutes per day for 5-10 days) recording data

### Next Generation Science Standards

- 5-LS2-1. Develop a model to describe the movement of matter among plants, animals, decomposers and the environment (emphasis is on the idea that matter that is not food [air, water, decomposed materials in soil] is changed by plants into matter that is food)
- 5-PS3-1. Use models to describe that energy in animals' food (used for body repair, growth, and motion and to maintain body warmth) was once energy from the sun (models could include diagrams or flow charts)

### Common Core State Standards

- RI.5.7 Draw on information from multiple print or digital sources, demonstrating the ability to locate an answer to a question quickly or to solve a problem efficiently.
- SL.5.5 Include multimedia components (e.g., graphics, sound) and visual displays in presentations when appropriate to enhance the development of main ideas or themes.

**Reference pages from Glimpse of the Chihuahuan Desert:** pages 22-23

**Materials** (consumables underlined):

- 1 laminated photo of desert food web
- 1 laminated photo of wet and dry playas

- 1 photo of playa organisms
- 1 aquarium thermometer
- 1 plastic bin
- 1 desk lamp with 60-watt bulb
- 1 small fish net
- 1 plastic container with playa soil (1 container for each class is in kit to start semester; playa soil used in each class may be discarded after the experiment is complete)
- 1 petri dish
- 1 magnifying glass
- Students need worksheets, pencils, scissors, glue or tape, and colored pencils

### Background

A **playa** is a shallow, undrained basin that can become temporarily filled with water after a rainstorm. Water may last in a playa for a few days to a few weeks. In this short amount of time, many amazing desert organisms hatch, find food, reproduce, and die.

Some playa organisms such as tadpole shrimp, fairy shrimp, and clam shrimp exist in an egg or **dormant** (sleeping) stage in the dry soil. When water is added, they rapidly become active and play out their life cycles in the brief time allowed by their temporary water supply. Algae, cyanobacteria, and **detritus** (decaying plant parts, animal remains, and waste) in the soil provide a constant food source for some of the organisms, while some eat other organisms in the soil and water.

In this activity, students learn about playa organisms and create a food web. A **food web** shows the transfer of energy and matter between organisms. At the base of all food webs are the **producers**, such as plants and algae, that are able to use the sun's energy to convert water as well as carbon dioxide from the air into food that can then be consumed by other organisms. **Consumers** eat producers or other consumers. **Decomposers** feed on dead plants, animals, or waste. They play a critical role as recyclers in the system by breaking down complex compounds in dead organisms and converting them into smaller molecules that can be used by plants and animals. We will see all of these types of organisms in the playa food web.

## Playa Food Web - Teacher's Guide

### Conocimiento de fondo

Una **playa** es una cuenca poco profunda y sin drenaje que puede llenarse temporalmente de agua después de una tormenta o aguacero. El agua puede durar en una playa por unos días o hasta unas semanas. En este tiempo breve, muchos organismos asombrosos del desierto eclosionan (nacen), encuentran comida, se reproducen y mueren.

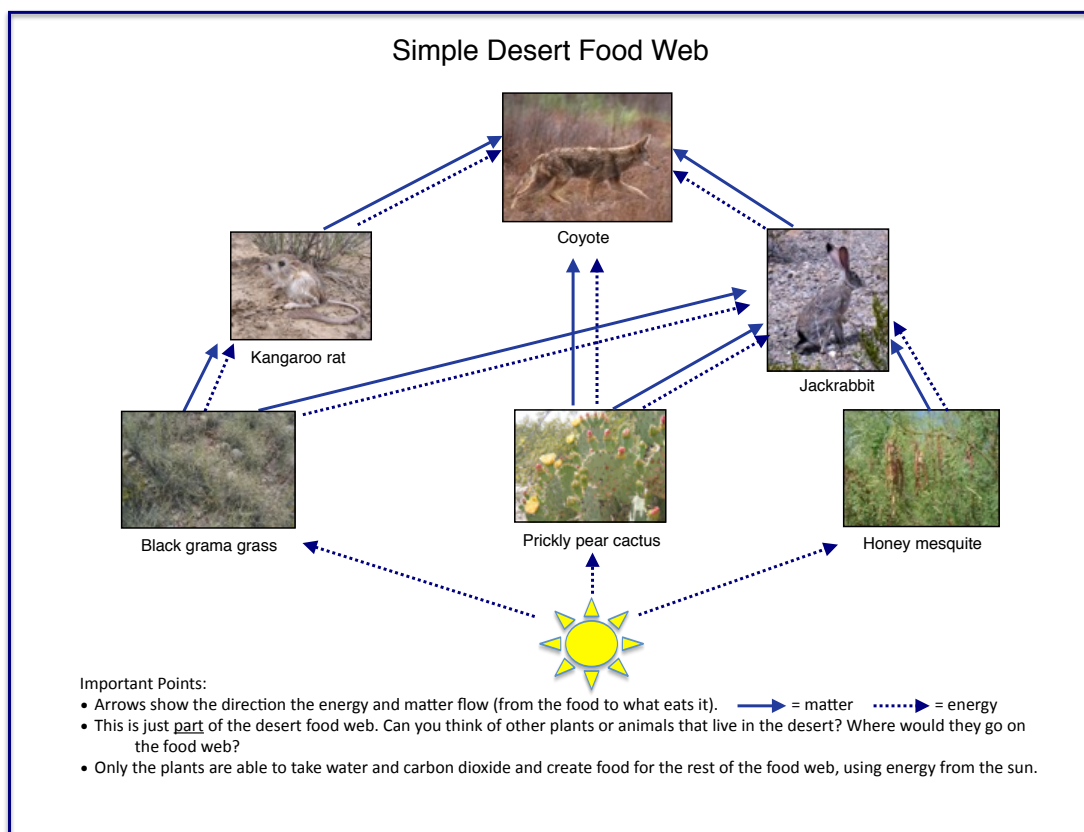
Algunos organismos de la playa como el camarón renacuajo, el camarón hada y el camarón almeja existen en un huevecillo o etapa latente (durmiente) en el suelo seco. Cuando se añade agua, estos organismos se activan y rápidamente llevan a cabo su ciclo de vida en el tiempo breve concedido por la provisión temporal del agua. Las algas, las cianobacterias y los **detritos** (plantas en estado de descomposición, restos de animales y desechos) en el suelo proveen una fuente constante de alimentos para algunos de los organismos, mientras otros comen algunos organismos en el suelo y el agua.

En esta actividad, los estudiantes aprenden acerca de los organismos de la playa y crean una red alimenticia. Una **red alimenticia**

muestra el traslado de energía y materia entre organismos. En la base de todas las redes alimenticias están los **productores**, tal como las plantas y las algas, que son capaces de usar la energía del sol para convertir el agua y el dióxido de carbono del aire en alimentos que pueden ser consumidos por otros organismos. Los **consumidores** se comen a los productores u otros consumidores. Los **descomponedores** o **desintegradores** se alimentan de plantas o animales muertos o de desechos. Estos juegan un papel crítico como recicladores del sistema desintegrando compuestos complejos en los organismos muertos convirtiéndolos en moléculas más pequeñas que puede ser usadas por las plantas y los animales. Veremos todos estos tipos de organismos en la red alimenticia de la playa.

### Part 1 Procedures – Food Web

1. Use the background information to explain the basics of a food web to your students. A simple food web with some desert organisms is shown below. A larger version of this food web that you can show your students is in the kit.



## **Playa Food Web - Teacher's Guide**

2. Show students photos of a local desert playa before and after rains. Explain what a playa is and ask students if they think there are organisms that live in the playa.
3. Give each student a copy of the playa organism cards and the student worksheet.
4. Show students how to use the table below showing **trophic level**, **prey**, and **predators** for each species. A copy of this table is on the student worksheet.
5. Instruct students to cut out the playa organism cards and use the information on the table to place them on the Playa Food Web worksheet.
6. After students have constructed the food web, have them answer the Analysis and Discussion questions.

Organism / Food	Trophic Level	Prey / Food	Predators / Grazers
algae	producer	makes own food	fairy shrimp, clam shrimp, tadpole shrimp, spadefoot toad
fairy shrimp	consumer	algae, cyanobacteria, detritus	tadpole shrimp, spadefoot toad, killdeer
tadpole shrimp	consumer	algae, cyanobacteria, clam shrimp, fairy shrimp	killdeer, spadefoot toad
NM spadefoot toad	consumer	fairy shrimp, algae, tadpole shrimp, clam shrimp	none in the playa
killdeer	consumer	tadpole shrimp, fairy shrimp, clam shrimp	none in the playa
clam shrimp	consumer	algae, cyanobacteria, detritus	tadpole shrimp, spadefoot toad, killdeer
cyanobacteria	producer	makes own food	fairy shrimp, clam shrimp, tadpole shrimp

### **Procedures – Mini Playa in the Classroom**

1. Add playa soil to the bottom of the plastic pan to a depth of approximately ½ inch.
2. Using water that sat out for at least two days to dissipate the chlorine, add water to the plastic pan. Fill the pan to approximately 1 inch from the top.
3. Place the bin under the lamp with a 60-watt bulb. Insert thermometer sensor in the water and leave the display outside the bin so you can monitor the water temperature. Adjust the distance from the lamp to the basin so the temperature is between 25°C and 28°C. You may turn out the light each night if necessary, although in a cold classroom, this may affect the development of the mini playa.
4. Fill the pitcher with tap water and let it sit out again. After two or more days, add water as needed.
5. Aquatic animals may appear after a few days. Once they appear, have students collect data on their Data Sheet. Using careful observation, students estimate the number of each species.
6. Playa organisms can be moved to the petri dish for closer observation. Place a small amount of water from the pan into the petri dish. Using the small fish net, carefully transfer an animal to the petri dish. Use a magnifying glass to look at these amazing creatures.
7. **IMPORTANT:** At the end of the experiment, please dispose of the playa soil from the bin and clean the bin for the next class. You may either let the water all evaporate first or dump the contents outside. Let students know that in nature, playas dry up after a short time and the adult shrimp die.

## ***Playa Food Web - Teacher's Guide***

### **Glossary**

consumer (*consumidor*) - an organism that gets food by consuming other organisms

decomposer (*descomponedor*) - an organism that feeds on dead plants, animals, and waste, recycling the nutrients and making them available for other organisms

detritus (*detrito*) - plant and animal matter resulting from decomposition

dormant (*latente*) - an inactive state; occurs in playa organisms when there is no water in the playa

food web (*red alimenticia*) - the feeding relationships between organisms; a food web diagram shows the flow of energy and matter between organisms

playa (*playa*) - a shallow, undrained basin that can become temporarily filled with water after a rainstorm

predator (*depredador*) - animals that get food by preying on other animals

prey (*presa*) - the organism that is eaten by the predator

producers (*productores*) - organisms such as plants that can create organic matter like sugar from carbon dioxide and water, using energy from the sun

trophic level (*nivel trófico*) - a level within a food web with organisms that share the same relationship to the food web's energy source (e.g., producers, consumers, decomposers)

### **Glosario**

consumidor (*consumer*) - un organismo que obtiene sus alimentos al consumir otros organismos

descomponedor (desintegrador) (*decomposer*) - un organismo que se alimenta de plantas y animales muertos y desperdicios, así reciclando los nutrientes y haciéndolos disponibles para otros organismos

depredador (*predator*) - animales que obtienen sus alimentos apresando a otros animales

detrito (*detritus*) - desecho o materia de plantas o animales como resultado de la descomposición

latente (*dormant*) - en estado inactivo; ocurre en los organismos de la playa cuando no hay agua en la playa

nivel trófico (*trophic level*) - un nivel dentro de una red alimenticia con organismos que comparten la misma relación en la fuente de energía de la red alimenticia (ej.: productores, consumidores, descomponedores)

playa (*playa*) - una cuenca poco profunda y sin drenaje que puede llenarse temporalmente de agua después de una tormenta o aguacero

presa (*prey*) - el organismo que es consumido por el depredador

productores (*producers*) - organismos como plantas que pueden crear materia orgánica como azúcar del dióxido de carbono y agua, usando energía del sol

red alimenticia (*food web*) - las relaciones alimenticias entre organismos; un diagrama de una red o cadena alimenticia muestra el flujo de energía y materia entre organismos

## Playa Food Web - Answer Key and Samples

### Analysis and Discussion

1. A tadpole shrimp uses a lot of energy to move throughout the playa looking for food. What is the **original** source of this energy?

**The energy comes from the Sun.** The algae and cyanobacteria use this energy to convert air and water into food and energy that can be used by the rest of the food web.

2. Which organism(s) in the playa food web create the food for the rest of the organisms by converting carbon dioxide from the air and water into food?

The producers – algae and cyanobacteria.

3. What do you think would happen if someone put three large fish in the playa that eat fairy shrimp, clam shrimp, and tadpole shrimp? Use the food web to explain your answer.

- a. Those fish would eat a lot of the fairy shrimp, clam shrimp, and tadpole shrimp, so there would be much less food for the spadefoot toad and the killdeer.
- b. There would be fewer animals eating the algae and cyanobacteria, so there would be more of them.
- c. The killdeer would probably leave the playa since there is less food for them.
- d. The spadefoot toads would probably start eating more algae.

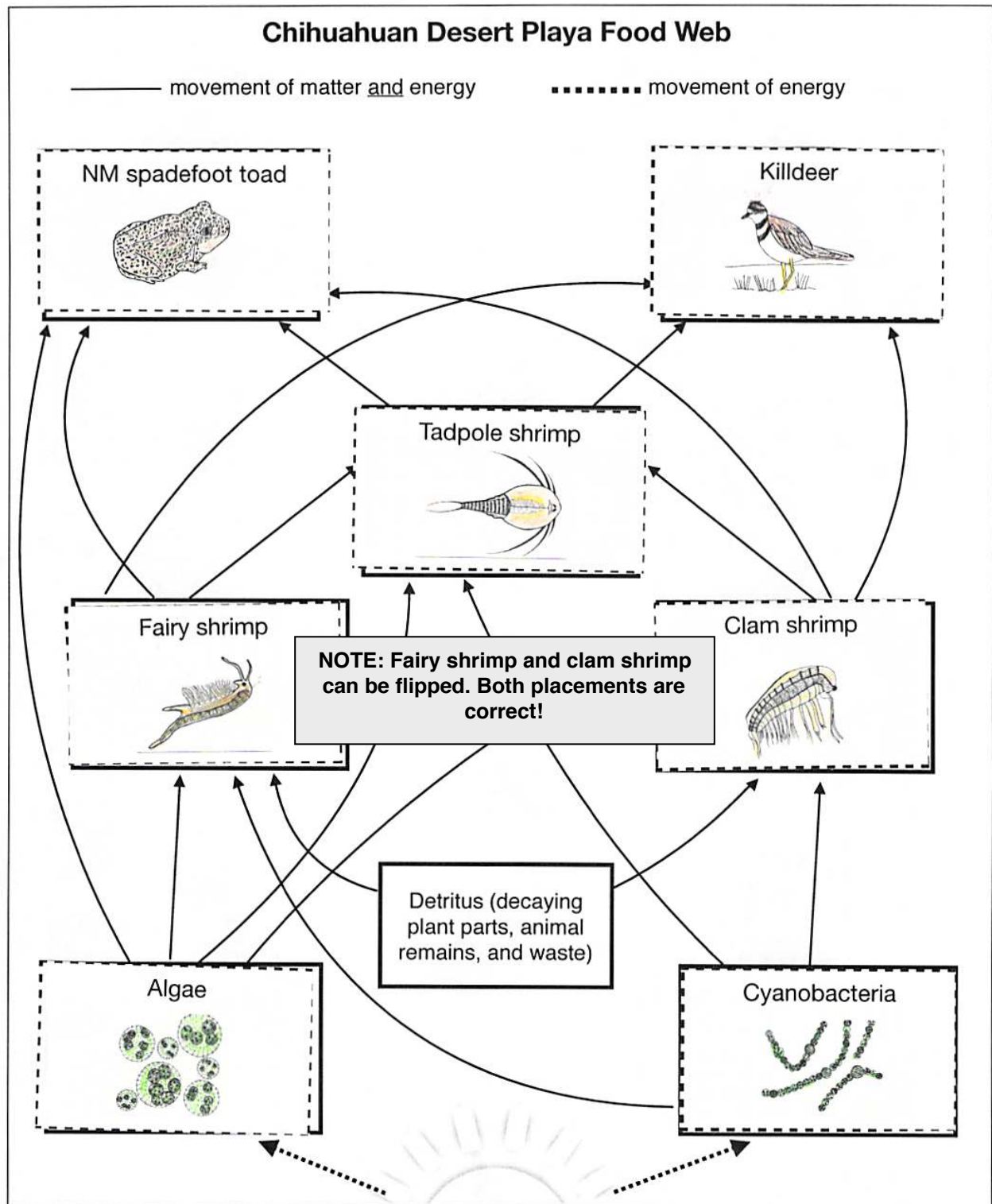
4. Based on your playa food web, name one:

Producer: algae (or cyanobacteria)

Consumer: fairy shrimp (or clam shrimp, tadpole shrimp, spadefoot toad, killdeer)

Decomposer: clam shrimp (or fairy shrimp)

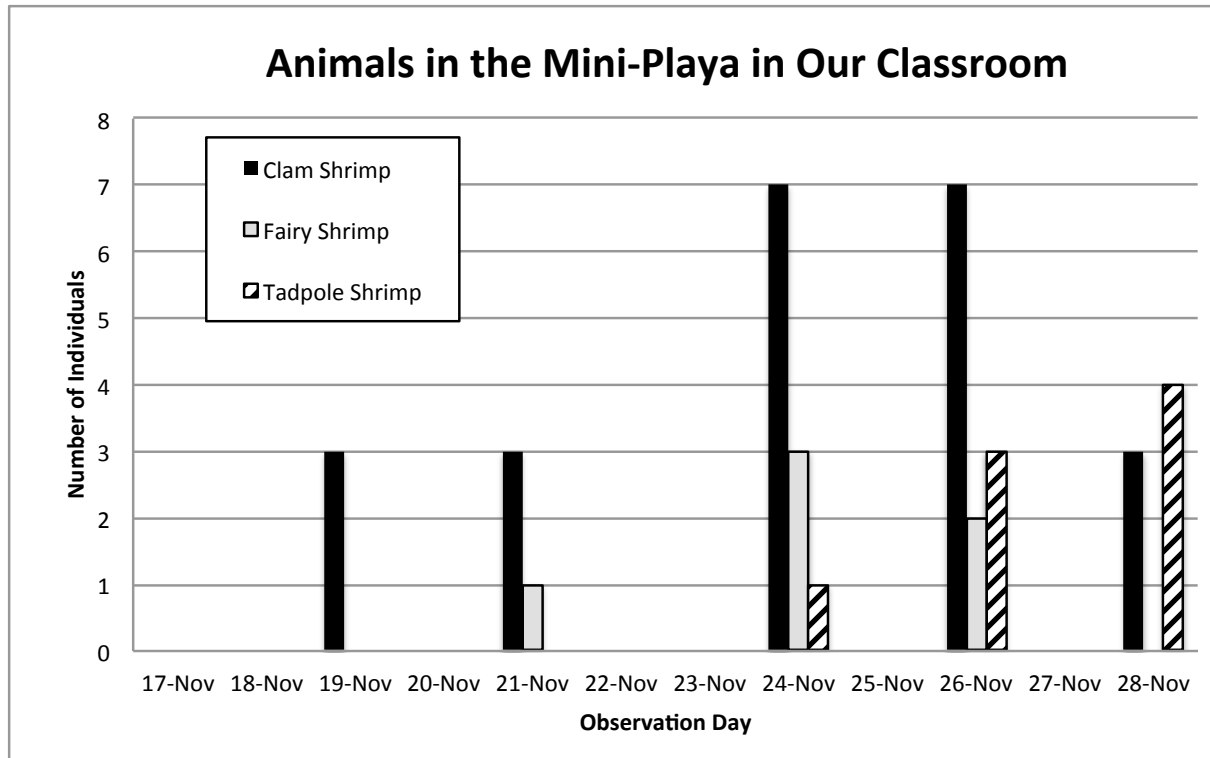
## Playa Food Web - Answer Key and Samples



**Playa Food Web - Answer Key and Samples**

Mini Playa Food Web Data Sheet					
		Estimated Number of Individuals of Each Species			
Date	Water Temp. °C	Clam shrimp	Fairy shrimp	Tadpole shrimp	Other species
11/17/14	25	0	0	0	0
11/19/14	26	3	0	0	0
11/21/14	25	3	1	0	0
11/24/14	24	7	3	1	0
11/26/14	25	7	2	3	0
11/28/14	26	3	0	4	0

## Playa Food Web - Answer Key and Samples



### Analysis and Discussion

1. Which species reached the highest numbers in the mini-playa? Clam shrimp
2. Did you see evidence of feeding relationships in the mini-playa? What did you see?

We saw clam shrimp feeding on something very small in the playa. We think it was algae. Then, a lot of clam shrimp disappeared, and we think the tadpole shrimp ate them.



Name: \_\_\_\_\_

Date: \_\_\_\_\_

## Playa Food Web Part 1 - Creating a Food Web

**Question:** What organisms live in a playa and what are the feeding relationships between them?

### Materials

- Playa Food Web worksheet
- Playa organisms cards
- Scissors
- Glue or tape

### Procedures

1. Cut out the playa organism cards.
2. Use the table below and determine where each organism should be placed on the Playa Food Web. Place them on the food web, but do not stick them down yet.

Organism / Food	Trophic Level	Prey / Food	Predators / Grazers
algae	producer	makes own food	fairy shrimp, clam shrimp, tadpole shrimp, spadefoot toad
fairy shrimp	consumer	algae, cyanobacteria, detritus	tadpole shrimp, spadefoot toad, killdeer
tadpole shrimp	consumer	algae, cyanobacteria, clam shrimp, fairy shrimp	killdeer, spadefoot toad
NM spadefoot toad	consumer	fairy shrimp, algae, tadpole shrimp, clam shrimp	none in the playa
killdeer	consumer	tadpole shrimp, fairy shrimp, clam shrimp	none in the playa
clam shrimp	consumer	algae, cyanobacteria, detritus	tadpole shrimp, spadefoot toad, killdeer
cyanobacteria	producer	makes own food	fairy shrimp, clam shrimp, tadpole shrimp

3. Ask your teacher to check the placement of your organisms on the food web.
4. Once your food web has been checked, glue or tape down the organisms.
5. Use your Playa Food Web to answer the Analysis and Discussion questions on the next page.

Name: \_\_\_\_\_

Date: \_\_\_\_\_

## Playa Food Web Part 1 - Creating a Food Web

### Analysis and Discussion

1. A tadpole shrimp uses a lot of energy to move throughout the playa looking for food. What is the **original** source of this energy?

\_\_\_\_\_

2. Which organism(s) in the playa food web create the food for the rest of the organisms by converting carbon dioxide from the air and water into food?

\_\_\_\_\_

3. What do you think would happen if someone put three large fish in the playa that eat fairy shrimp, clam shrimp, and tadpole shrimp? Use the food web to explain your answer.

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\_\_\_\_\_

4. Based on your playa food web, name one:

Producer: \_\_\_\_\_

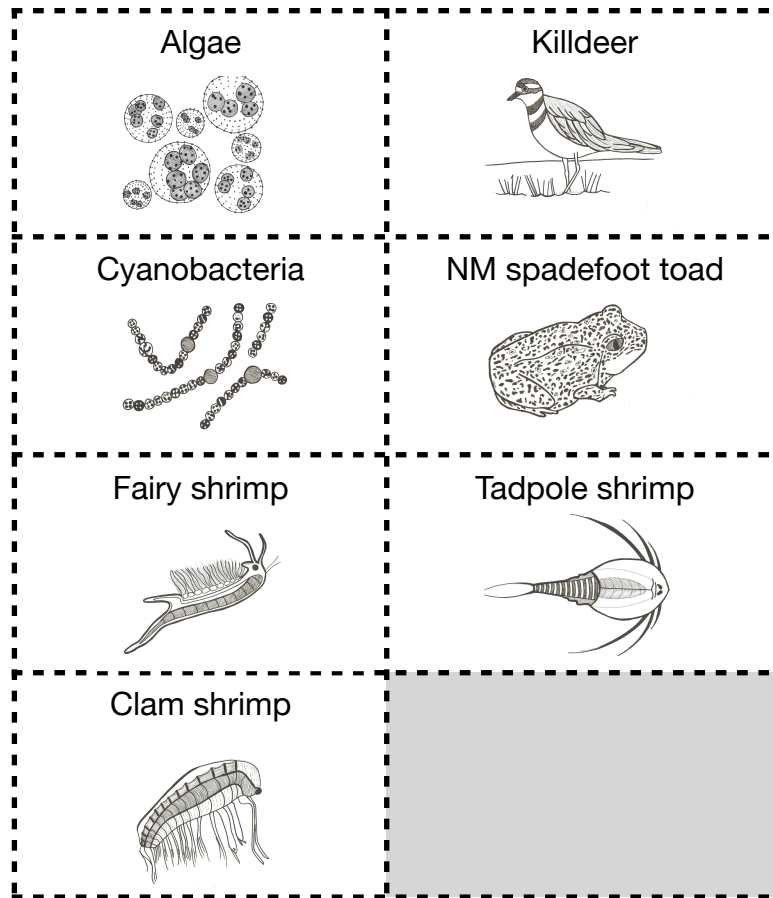
Consumer: \_\_\_\_\_

Decomposer: \_\_\_\_\_

Name: \_\_\_\_\_

Date: \_\_\_\_\_

**Playa Food Web Cards**  
(color and cut out along dotted lines)



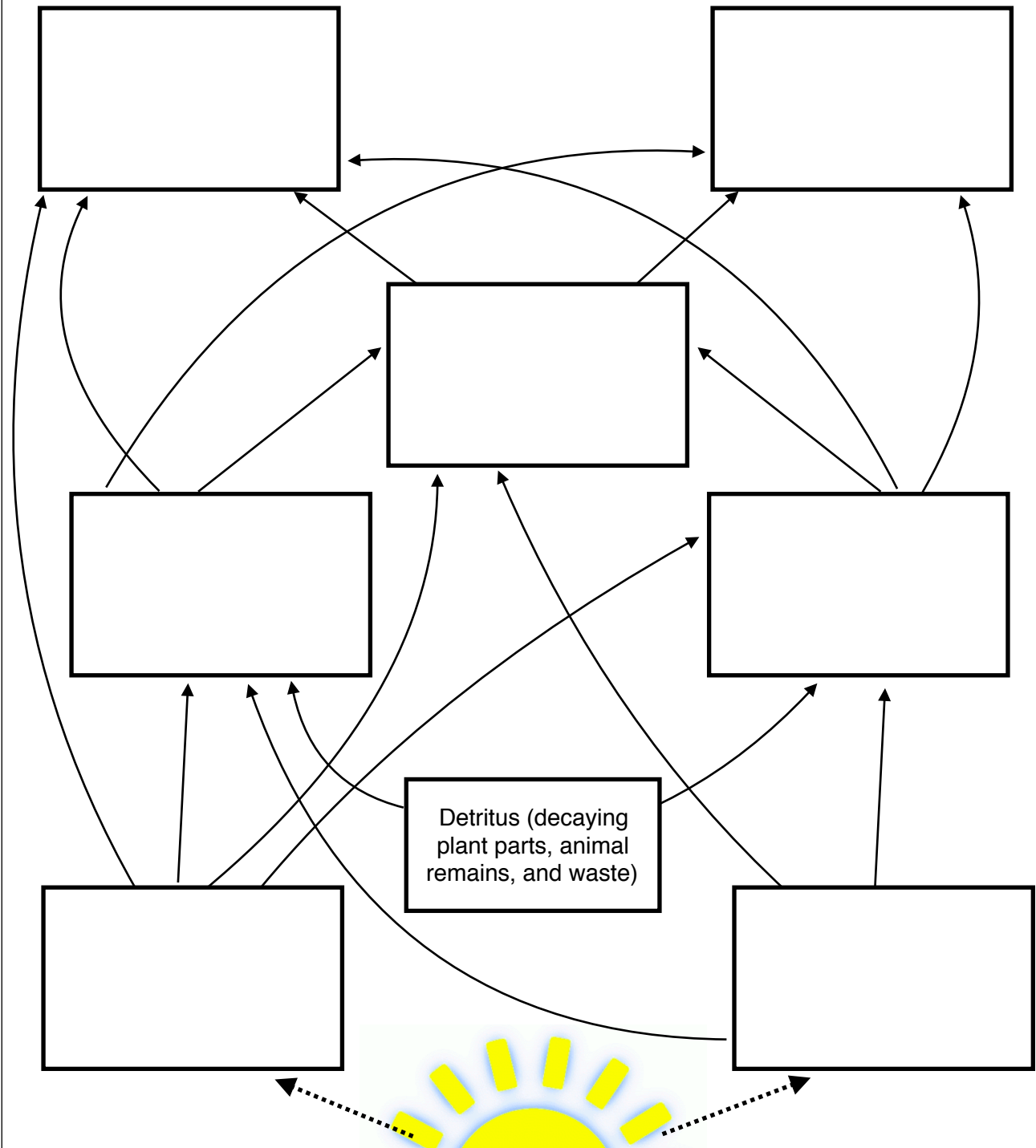
Name: \_\_\_\_\_

Date: \_\_\_\_\_

### Chihuahuan Desert Playa Food Web

———— movement of matter and energy

..... movement of energy



Name: \_\_\_\_\_

Date: \_\_\_\_\_

## **Playa Food Web Part 2 - Mini Playa in the Classroom**

**Question:** How does the ecosystem of a mini playa in the classroom change over time?

### **Materials**

- Plastic bin
- Playa soil
- Aquarium thermometer
- Desk lamp with 60-watt bulb
- Small fish net
- Petri dish
- Magnifying glass

### **Procedures - Setting Up the Mini Playa**

1. Add playa soil to the bottom of the plastic pan to a depth of approximately ½ inch.
2. Using the water that sat out for at least two days to help dissipate the chlorine, add water to the plastic pan. Fill the pan to approximately 1 inch from the top.
3. Place the bin under the desk lamp with a 60-watt bulb. Insert thermometer into the water so you can keep track of the water temperature. Adjust the distance from the lamp to the basin so the temperature is between 25°C and 28°C. You may turn out the light each night if necessary, although in a cold classroom, this may affect the development of the mini playa.
4. Fill the pitcher or bucket with tap water and let it sit out again. After two or more days, add water to the basin as needed.

### **Procedures - Observing the Mini Playa**

1. Every 1-3 days, make careful observations to estimate the number of each species of animals in the mini playa.
2. Record the water temperature and number of individuals on the Mini Playa Food Web Data Sheet. If you need a closer look at the playa organisms, ask your teacher to carefully transfer animals into the petri dish with water in it using the small fish net.
3. At the end of two weeks, create a graph of your data from your Mini Playa Food Web Data Sheet.
4. Answer the Data Analysis and Discussion questions.

Name: \_\_\_\_\_

Date: \_\_\_\_\_

### Mini Playa Food Web Data Sheet

Date	Water Temp. °C	Estimated Number of Individuals of Each Species			
		Clam shrimp	Fairy shrimp	Tadpole shrimp	Other species

Name: \_\_\_\_\_

Date: \_\_\_\_\_

Number of Individuals


Observation Day

**Analysis and Discussion**

1. Which species reached the highest numbers in the mini playa? \_\_\_\_\_

2. Did you see evidence of feeding relationships in the mini playa? What did you see?

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Nombre: \_\_\_\_\_

Fecha: \_\_\_\_\_

## Red Alimenticia de la Playa

### Parte 1 – Creando una Red Alimenticia

**Pregunta:** ¿Cuáles organismos viven en una playa y cuáles son las relaciones alimenticias entre ellos?

**Materiales:**

- Hoja de trabajo Red Alimenticia de la Playa
- Tarjetas de los organismos de la playa
- Tijeras
- Pegamento o cinta

**Procedimientos**

1. Corta las tarjetas de los organismos de la playa.
2. Usa la tabla abajo y determina en dónde debe ponerse cada organismo en la *Red Alimenticia de la Playa*. Ponlos en la red alimenticia, pero no los pegues todavía.

Organismo / Comida	Nivel trófico	Presa / Comida	Depredadores / Pastoreadores
algas	productor	hacen su propia comida	camarón hada, camarón almeja, camarón renacuajo, sapo de espuelas
camarón hada	consumidor	algas, cianobacterias, detritus	camarón renacuajo, sapo de espuelas, tildío (ave)
camarón renacuajo	consumidor	algas, cianobacterias, camarón almeja, camarón hada	tildío (ave), sapo de espuelas
sapo de espuelas de Nuevo México	consumidor	camarón hada, algas, camarón renacuajo, camarón almeja	ningunos
tildío (ave)	consumidor	camarón renacuajo, camarón hada, camarón almeja	ningunos
camarón almeja	consumidor	algas, cianobacterias, detritus	camarón renacuajo, sapo de espuelas, tildío (ave)
cianobacterias	productor	hacen su propia comida	camarón hada, camarón almeja, camarón renacuajo

3. Pídele a tu maestro/a que revise la colocación de tus organismos en la red alimenticia.
4. Una vez que tu red alimenticia sea revisada, pega los organismos con cinta o pegamento.
5. Usa tu *Red Alimenticia de la Playa* para contestar las preguntas de *Análisis y Discusión* en la próxima página.



Nombre: \_\_\_\_\_

Fecha: \_\_\_\_\_

## Red Alimenticia de la Playa

### Parte 1 – Creando una Red Alimenticia

#### Análisis y Discusión

1. Un *camarón renacuajo* usa mucha energía para moverse por la playa buscando comida. ¿Cuál es la fuente **original** de esta energía?

\_\_\_\_\_

2. ¿Cuáles organismos en la red alimenticia de la playa crean los alimentos para el resto de los organismos al convertir el dióxido de carbono del aire y el agua en comida?

\_\_\_\_\_

3. ¿Qué piensas que sucedería si alguien pone tres peces grandes en la playa que comen *camarón hada*, *camarón almeja* y *camarón renacuajo*? Usa la red alimenticia para explicar tu respuesta.

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\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

4. Basado en tu red alimenticia de la playa, nombra un:

Productor: \_\_\_\_\_

Consumidor: \_\_\_\_\_

Descomponedor: \_\_\_\_\_

Nombre: \_\_\_\_\_

Fecha: \_\_\_\_\_

**Tarjetas de la Red Alimenticia de la Playa**  
(colorea y corta a lo largo de las líneas punteadas)



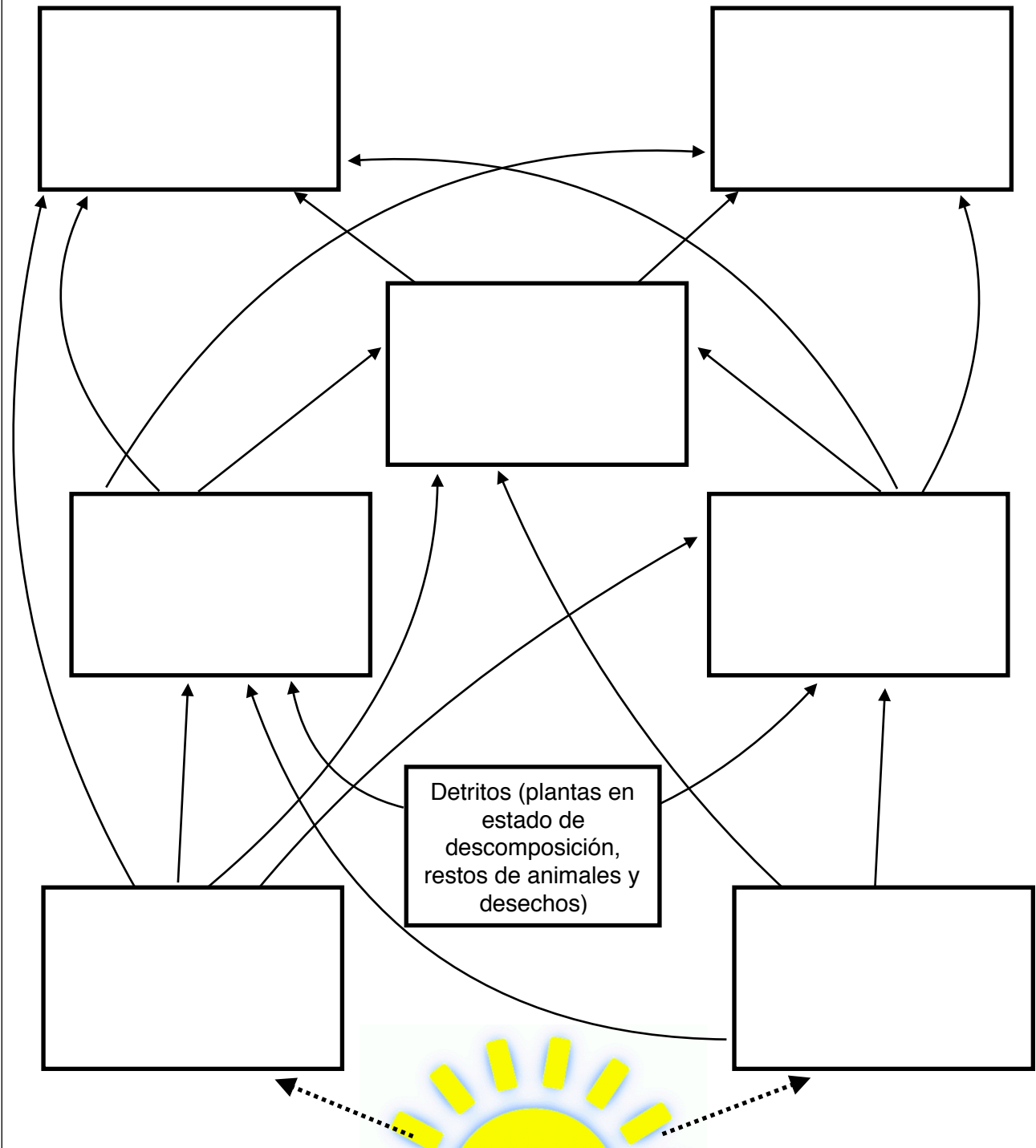
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Fecha: \_\_\_\_\_

## Red Alimenticia de la Playa del Desierto Chihuahuense

— movimiento de materia y energía

..... movimiento de energía



Nombre: \_\_\_\_\_

Fecha: \_\_\_\_\_

## **Red Alimenticia de la Playa**

### **Parte 2 - Mini Playa en el Salón de Clases**

**Pregunta:** ¿Cómo cambia el ecosistema de una mini playa en el salón de clases con el tiempo?

#### **Materiales**

- Contenedor de plástico
- Suelo de playa
- Termómetro
- Lámpara de escritorio con una bombilla de 60 vatios
- Red pequeña para peces
- Placa petri
- Lupa

#### **Procedimientos – Arreglando la Mini Playa**

1. Añade el suelo de playa en el fondo del contenedor de plástico a una profundidad de aproximadamente  $\frac{1}{2}$  pulgada.
2. Usando el agua que se quedó en reposo y al descubierto por lo menos dos días para disipar el cloro, añade esta agua al contenedor plástico. Llena el contenedor dejando aproximadamente 1 pulgada de distancia de la orilla del contenedor.
3. Coloca el contenedor bajo la lámpara de escritorio con una bombilla de 60 vatios. Pon el termómetro en el agua para seguir la temperatura del agua. Ajusta la distancia entre la lámpara y el contenedor para que la temperatura se mantenga entre 25°C y 28°C. Puedes apagar la lámpara cada noche si es necesario, pero recuerda que un salón de clases frío puede afectar el desarrollo de la mini playa.
4. Llena la jarra o cubeta con agua de la llave y déjala en reposo al descubierto otra vez. Después de dos o más días, añade agua al contenedor como sea necesario.

#### **Procedimientos – Observando la Mini Playa**

1. Cada 1-3 días, haz observaciones cuidadosas para estimar el número de cada especie de animales en la mini-playa.
2. Anota la temperatura del agua y número de seres en la Hoja de Datos de la Red Alimenticia de la Mini Playa. Si necesitas observar más de cerca a los organismos de la playa, pídele a tu maestro/a que traslade animales con mucho cuidado a la placa petri con agua usando la red pequeña para peces.
3. Al fin de dos semanas, crea una gráfica con tus datos de tu Hoja de Datos de la Red Alimenticia de la Mini Playa.
4. Contesta las preguntas de Análisis y Discusión.

Nombre: \_\_\_\_\_

Fecha: \_\_\_\_\_

### Hoja de Datos de la Red Alimenticia de la Mini Playa

		Numero Estimado de Individuos de Cada Especie			
Fecha	Temp. del Agua °C	Camarón almeja	Camarón hada	Camarón renacuajo	Otras especies

Nombre: \_\_\_\_\_

Fecha: \_\_\_\_\_

Número de Individuos de Cada Especie


Día de Observación

#### Análisis y Discusión

1. ¿Cuál especie alcanzó el número más alto en la mini playa? \_\_\_\_\_

2. ¿Viste evidencia de relaciones alimenticias en la mini playa? ¿Qué viste?

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