Ecosystem Explorers

Rocky Mountain National Park

A Changing, Living Land

As you hike up a mountain trail you can see and feel natural changes. The air turns cooler the higher you go. The trees and plants – and the animals that depend on them for food and shelter – also change as you pass through distinct plant and animal communities called ecosystems. There are four ecosystems in the park:

MONTANE: Found at the park's lower elevations, it's the warmest and driest ecosystem.

SUBALPINE: Higher up, it turns cooler and wetter. You might see snow in the thick subalpine forests well into summer.

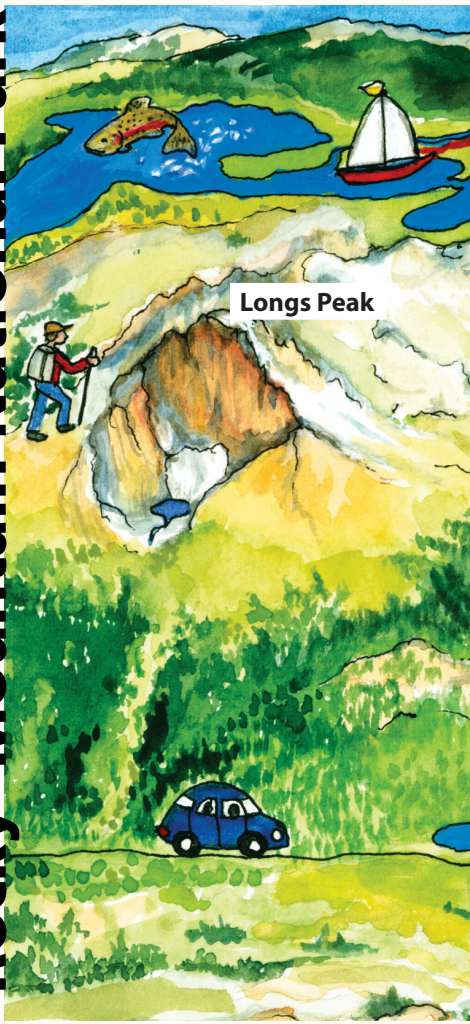
ALPINE TUNDRA: The trees are gone in this arctic-like place way up high. The weather may be windy and cold, and snow can fall in July and August.

RIPARIAN: No matter which ecosystem you're in, land next to lakes and streams is called riparian land.

In the pages that follow, you'll see detailed illustrations of each ecosystem. Complete the pages for your ecosystem in addition to page 10. The pictures will show you that the park's changing ecosystems are full of life, even though you might not see it at first glance.

Let's go explore!

Rocky Mountain National Park



Montane Ecosystem

Elevation: 5,600-9,000ft
Average Precipitation: 15 inches of rain & 5 inches of snow

Many of the animals in the park modify their behavior when the seasons change. For example, during the winter, animals will **migrate, hibernate** or adapt to **tolerate** the colder temperatures and snow. Using the pictures and animal descriptions in this scene, identify and list one animal that might use each of these strategies for survival.

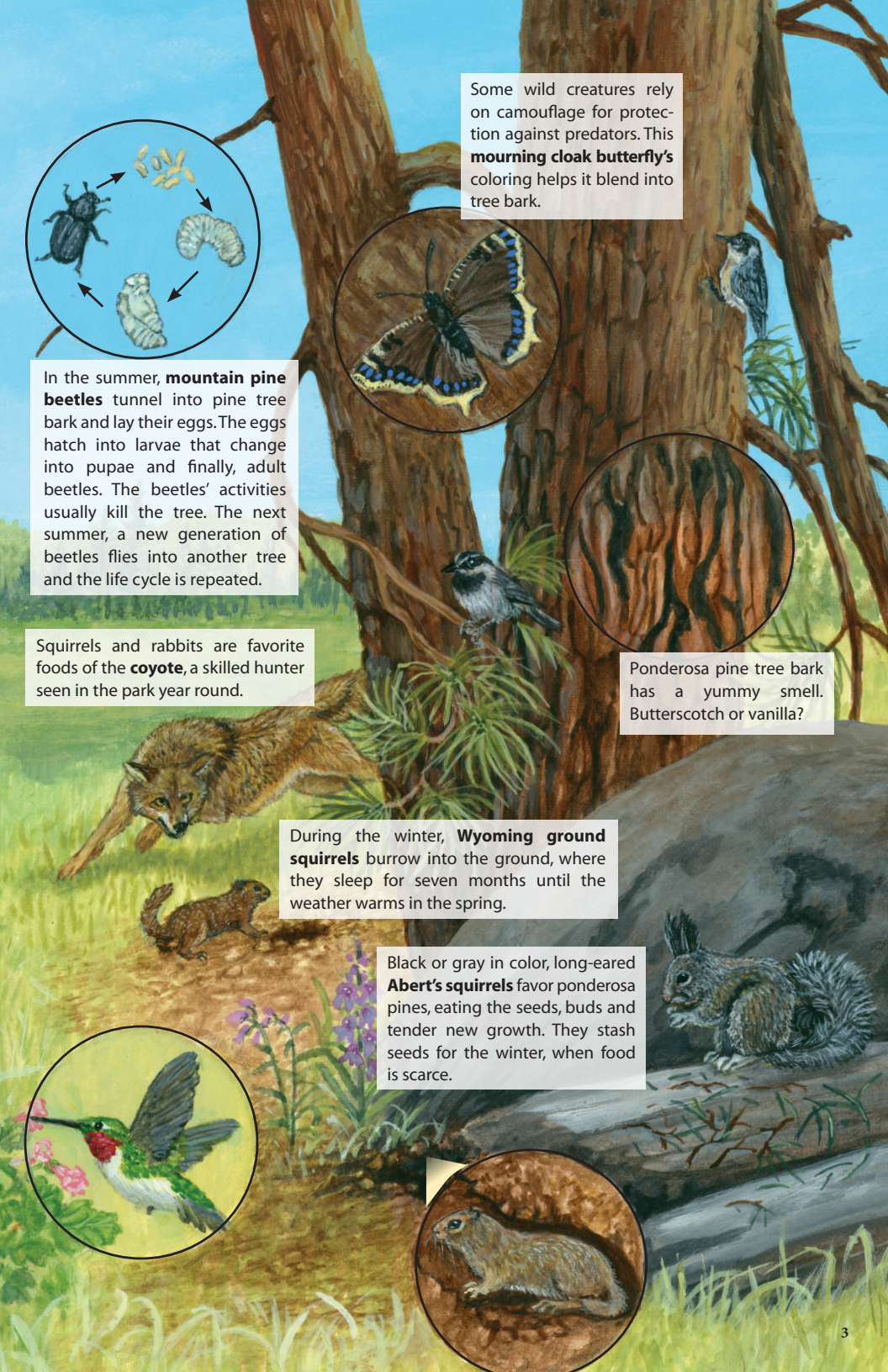
Tolerate_____

Migrate_____

Hibernate_____

Mountain bluebirds return to the park in the spring after being gone all winter. They build their nests and hatch their young in tree cavities usually made by woodpeckers.

While flying from flower to flower sipping sweet nectar, **hummingbirds** unknowingly spread pollen, which helps plants make seeds and reproduce. The tiny birds need this high-energy liquid food source to fuel their long flights south for the winter.



Some wild creatures rely on camouflage for protection against predators. This **mourning cloak butterfly's** coloring helps it blend into tree bark.

In the summer, **mountain pine beetles** tunnel into pine tree bark and lay their eggs. The eggs hatch into larvae that change into pupae and finally, adult beetles. The beetles' activities usually kill the tree. The next summer, a new generation of beetles flies into another tree and the life cycle is repeated.

Ponderosa pine tree bark has a yummy smell. Butterscotch or vanilla?

Squirrels and rabbits are favorite foods of the **coyote**, a skilled hunter seen in the park year round.

During the winter, **Wyoming ground squirrels** burrow into the ground, where they sleep for seven months until the weather warms in the spring.

Black or gray in color, long-eared **Abert's squirrels** favor ponderosa pines, eating the seeds, buds and tender new growth. They stash seeds for the winter, when food is scarce.

At home in the fir and spruce **trees** of the cool, dense subalpine forests, **American martens** are ferocious hunters. Their prey includes small mammals and birds.

Who's eating whom? There is a constant flow of energy through the web of life and within each ecosystem. Studying the images and information in this scene, give one example of the flow of energy in the subalpine ecosystem by filling in the blanks. (The words in **bold** will help provide the answers.)

Producer ⇨ _____ **Herbivore ⇨** _____ **Carnivore**

Patches where the tree bark is missing may be the work of **porcupines,** which eat the tender inner bark.

The slim body of the **long-tailed weasel** enables it to enter dens to find prey like this slumbering **chipmunk** and other **squirrels**.

Subalpine Ecosystem

Elevation: 9,000-11,000ft
Average Precipitation: 60 inches of snow

Hawks and other raptors have a diet of birds and small mammals. This **northern goshawk** is chasing a **dusky grouse**.

Chickarees, or **red squirrels**, pile up mounds of **pinecone** pieces called middens on the forest floor as they tear apart the cones to find the tasty **seeds**.

Mushrooms help dead trees and other plant life decompose. The mushroom cap provides food for this **golden-mantled ground squirrel** and other animals.

Clark's nutcrackers are natural gardeners that store pinecone seeds in the ground for winter food. Some seeds the birds forget to dig up will sprout and grow into trees.

The park's alpine tundra is a vast, cold landscape. The changing climate is affecting this high, windswept world. After you study the animals and plants in this scene, make three predictions about what may happen to life on the alpine tundra as the climate warms.

1. _____

2. _____

3. _____

The hum of **bumblebees** can be heard on the tundra as these pollinators seek the nectar of beautiful alpine flowers. These insects can only fly in temperatures above 50 degrees.

Pikas store plant material in the rock piles that give them shelter. The hay piles provide winter food for these tiny members of the rabbit family. Pikas have adapted to the cold and snow, but the warming climate poses the threat of less insulating snow during the long alpine winters.

Many tundra **wildflowers** are unique to this high-elevation environment. Each plant has special adaptations for survival. The alpine sunflower, or *Rydbergia*, gathers energy in its roots for up to 15 years, blooms just once and dies.

The **white-tailed ptarmigan** is the only bird that spends its entire lifetime above treeline. In the summer, these birds are well-camouflaged as they hide among rock piles and willows. In winter, their feathers molt to white, making them invisible on tundra snowfields.

Alpine Tundra
Ecosystem

Elevation: 11,000ft +
Average Precipitation: 40 inches of snow

Trees can't tolerate the constant cold and severe winds on the alpine tundra. Trees thrive in warmer conditions, where they can produce food and take in water.

A summer tundra resident, the **horned lark** builds its nest – and spends much of its time – on the ground. Migrating birds like the horned lark depend on specific climate patterns and amounts of daylight for their survival.

Lichens are plants that grow in the harshest of conditions. Commonly seen on rocks, lichens produce an acid that breaks down the rock.

Long, slender mounds of earth called eskers are made by the underground tunneling of **northern pocket gophers**.

This scene introduces some of the animals that call the riparian ecosystem home. Think about how you use water. If water quality is affected by pollution, what could that mean for these animals? And for you? Write a couple of sentences describing your thoughts.

Dragonflies lay their eggs on aquatic plants or in the water. The eggs hatch into nymphs that live underwater and later emerge on the stems of plants to shed their skin. Full-grown dragonflies fly away.

The legs of the **water strider** have tiny hairs that collect air bubbles, allowing these little insects to "skate" on the surface of the water. This one is being eyed by a hungry **cutthroat trout** swimming in the pure water below.

This little bird, the **American dipper**, catches insects, small fish and other aquatic prey by swimming and walking underwater.

Plants that grow underwater in the pristine high country lakes and streams are favorite summer foods for **moose**, the largest member of the deer family. Moose are most commonly seen on the west side of the park.

Riparian Ecosystem

Elevation: varies- not dependent on elevation
Precipitation: varies widely

Many **beaver** raise their young in lodges built from sticks and mud. The beavers' "front door" often is an underwater entrance.

Willows thrive in water-rich environments, and are a primary food source for aquatic animals such as beaver and moose.

This bird lives up to its name. The **kingfisher** dives into clear, cold mountain lakes and streams to catch small fish, its favorite food.

The **tiger** salamander leaves its winter den in the spring to breed in water, where it feasts on insects and other prey.

Food Web Connections

These activities exploring the park's ecosystems help show how animals and plants interact with the environment and how all life is connected. Using your knowledge of predator and prey relationships, draw arrows from each animal to the foods you think it eats (other animals or plants). **Hint:** Some animals eat more than one.

Red-tailed Hawk

Mountain Lion

Coyote

Mule Deer

Golden-mantled Ground Squirrel

Nuttall's Cottontail

Grasses, Shrubs and Wildflowers