



15. Who Lives Where?

Bosque Animals

Description: Students place animals into the proper habitat on the bosque model and then change the model with human alteration to see which animals thrive and which do not.

Objective: Students will:

- become familiar with some animals that live in the bosque;
- infer the animal's current status; and
- predict the future of animals in the changing bosque environment.

Materials: pictures of the animals
descriptions of the animals
"Changing River" activity materials for Rio Bravo and Rio Manso

Procedure:

1. Cut out the animal pictures and information cards for each animal. Choose which of the animal description cards you will use—each animal has separate cards for older students and younger students (text for older students on top in a single-line box; younger students below in larger type with double-line box). The cards should be cut apart and may be colored. We recommend copying the Rio Bravo animals and descriptions on a different color paper than the Rio Manso animals. You may want to code the pictures and descriptions so they can be matched after being mixed up. (A list is included here.) It is best if the name of the animal appears only on the picture and not the description.

15. Who Lives Where?



Grades: 2–12

Time: Material preparation: approximately 30 minutes
Activity: one 40-minute class period

Subjects: science

Terms: *adaptation, aquatic, barbels, breed, cavity, camouflage, carrion, colonize, detritus, disease, echolocation, endangered, extinct, gills, habitat, hectare, hibernate, introduced species, larva, meander, metamorphosis, non-native species, plague, predator, prey, raptor, scat, sonar, threatened, transparent, tributary, trilling*

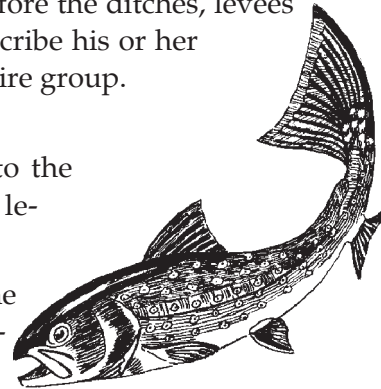


Section A: Rio Bravo

2. Set up the river as Rio Bravo (see “Changing River” activity).
 3. Option a: Animal Match: Hand out to the class the cards with pictures and descriptions of the Rio Bravo animals, making sure that no student receives the picture and drawing for the same animal. Have the students take turns reading a description, with classmates guessing which animal is being described. The student with the matching drawing should place the animal on the model in the habitat described in the reading. Continue around the room until all the animal descriptions are read and all the drawings are placed on the model.
- or
- Option b: If you have less class time, hand out the animals with their descriptions to the students. Each student should have at least one animal of his or her own. Have the student carefully read the description and decide where that animal lives. What is its habitat? Students should then place the animal on the bosque model in a location where it would best live. Place them on the Rio Bravo bosque—before the ditches, levees and homes. Have each student describe his or her animal and where it lives to the entire group.

Section B: Rio Manso

4. Now add the human alterations to the bosque model: irrigation ditches, levees, jetty jacks, etc. (Rio Manso).
5. Place the introduced species on the model, using the method from Option A or Option B above. Ask the students if any of their animals are affected by the change in the river or the introduced species of animals. Which animals are thriving because of the changes and which have lost habitat?
6. Have the class review “Threatened and Endangered Animals” near the end of this activity—a brief summary of some threatened, endangered, or extinct bosque animals.



Section C: Rio Nuevo

7. Discuss what impacts restoration projects can have on these animals (Rio Nuevo changes). Using restoration project ideas from “Changing River” or from the students themselves, adjust the cards (such as removing exotic species) based on student discussion.



- Extensions:**
1. Combine this activity with “Who Grows Where” in this chapter to compare plants and animals. Look for opportunities to place animals on the model with the plants that provide their habitat.
 2. Use the animal cards and plant cards from the “Who Grows Where?” activity to do “The Web” activity in this guide.
 3. Use the overview of introduced and non-native species at the end of this activity to further discuss the current situation in the bosque. What animals are being, or have been, displaced by these introduced species?
 4. Oral history extension: send animal pictures home with students to ask elders about local names and stories about them.

Who Lives Where? Rio Bravo

Common Name	Scientific Name
Mayfly	<i>Baetis sp.</i>
Caddisfly	<i>Hydropsyche sp.</i>
Mosquito	many spp.
Cricket	<i>Gryllus sp.</i>
Leaf-roller	<i>Anacampis innocuella</i>
Floodplain cicada	<i>Tibicen marginalis</i>
Harvester ant	<i>Pogonomyrmex sp.</i>
Northern leopard frog	<i>Rana pipiens</i>
Western chorus frog	<i>Pseudacris triseriata</i>
New Mexico whiptail	<i>Aspidoscelis neomexicanus</i>
Garter snake	<i>Pecari sp.</i>
Bull snake	<i>Pituophis catenifer</i>
Spiny softshell turtle	<i>Apalone spinifera</i>
Western painted turtle	<i>Chrysemys picta</i>
Mallard	<i>Anas platyrhynchos</i>
Canada goose	<i>Branta canadensis</i>
Bald eagle	<i>Haliaeetus leucocephalus</i>
Cooper’s hawk	<i>Accipiter cooperii</i>
Great horned owl	<i>Bubo virginianus</i>
Great blue heron	<i>Ardea herodias</i>
Sandhill crane	<i>Grus canadensis</i>
Killdeer	<i>Charadrius vociferous</i>
Yellow-billed cuckoo	<i>Coccyzus americanus</i>
Roadrunner	<i>Geococcyx californianus</i>
Belted kingfisher	<i>Ceryle alcyon</i>
Crow	<i>Corvus brachyrhynchos</i>
Southwestern willow flycatcher	<i>Empidonax traillii extimus</i>



Summer tanager	<i>Piranga rubra</i>
Red-winged blackbird	<i>Agelaius phoeniceus</i>
Beaver	<i>Castor canadensis</i>
Muskrat	<i>Ondatra zibethicus</i>
Little brown bat	<i>Myotis lucifugus</i>
Meadow jumping mouse	<i>Zapus hudsonius</i>
White-footed mouse	<i>Peromyscus leucopus</i>
Botta pocket gopher	<i>Thomomys bottae</i>
Desert cottontail	<i>Sylvilagus audubonii</i>
Coyote	<i>Canis latrans</i>
Mule deer	<i>Odocoileus hemionus</i>
Rio Grande silvery minnow	<i>Hybognathus amarus</i>
Rio Grande bluntnose shiner	<i>Notropis simus simus</i>
Red shiner	<i>Cyprinella lutrensis</i>
Shovelnose sturgeon	<i>Scaphirhynchus platyrhynchus</i>

Who Lives Where? Rio Bravo: Upper Watershed Adaptations

American dipper	<i>Cinclus mexicanus</i>
Elk	<i>Cervus elaphus</i>
Black bear	<i>Ursus americanus</i>
American osprey	<i>Pandion haliaetus</i>
Rio Grande cutthroat trout	<i>Oncorhynchus clarki virginalis</i>

Who Lives Where? Rio Manso: Animals Introduced to the Middle Rio Grande Bosque

Isopods: Pillbug and Sowbug	<i>Armadillidium vulgare</i> and <i>Porcellio laevis</i>
Bullfrog	<i>Rana catesbeiana</i>
Mosquitofish	<i>Gambusia sp.</i>
Carp	<i>Cyprinus carpio</i>
House sparrow	<i>Passer domesticus</i>
European starling	<i>Sturnus vulgaris</i>
House mouse	<i>Mus musculus</i>
Feral Dogs and Cats	

Who Lives Where? Rio Manso: Upper Watershed Adaptations: Introduced

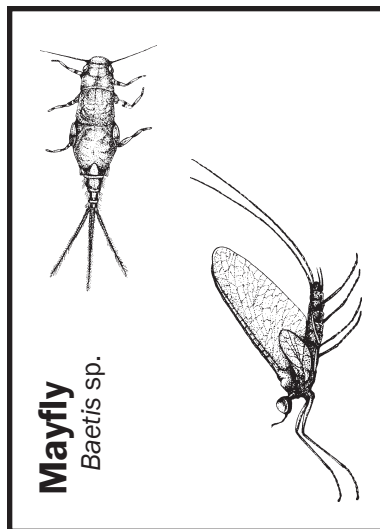
Rainbow trout	<i>Oncorhynchus mykiss</i>
Brown trout	<i>Salmo trutta</i>



Who Lives Where? cards

Part 1A: Rio Bravo: Animals Native to the Rio Grande Bosque

Text for older students top in single-line box, for younger students below in larger type in double-line box.



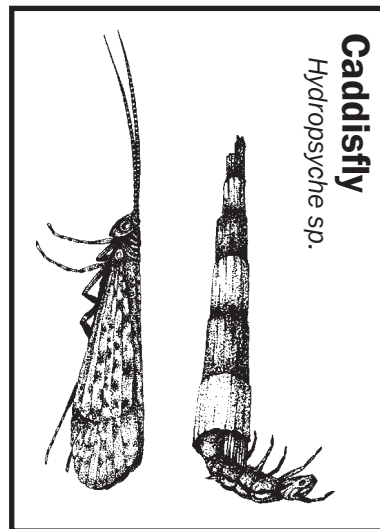
I have six legs and three tails. I spend most of my time under water in places where the sand moves around. I usually eat algae and detritus (dee-try-tus)—small pieces of dead plants or animals in the water. As an adult, I live for only a day or two and I don't eat. I attach my eggs to stones or other objects in the water. Many fish eat me, both when I'm young and as an adult. I am named for a month when I can often be seen.

I have six legs and three tails. I live underwater in places where the sand moves around. I eat algae and small pieces of dead plants or animals in the water. As an adult, I only live for a day or two and I don't eat. I hook my eggs to stones or other things in the water. Many fish eat me. I am named for a month when I can often be seen.

Rio Bravo

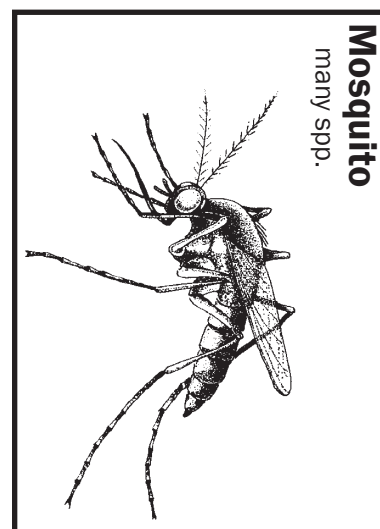
When I hatch from my egg I am a larva. I cover my body with tiny sticks or rocks which make my home. I live on underwater gravel bars in fast-moving water where I catch my food. I eat algae, detritus (dee-try-tus) —small pieces of dead plants or animals—and small animals in the water. Fish love to eat me. As an adult, I have large wings to help me fly along the river.

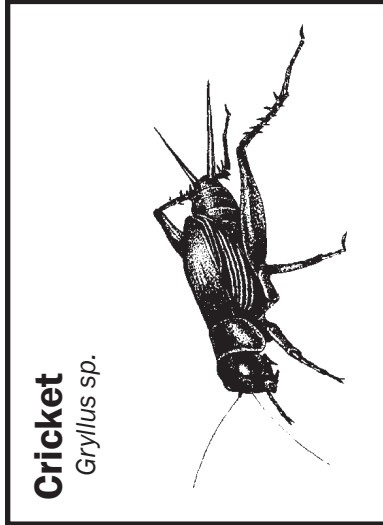
After I hatch from my egg, I cover my body with tiny sticks or rocks that make my home. I live in fast moving water where I catch my food. I eat algae, small pieces of plants or animals. Fish love to eat me. As an adult, I have large wings to help me fly along the river.



I live in standing pools of water when I'm young. I have a breathing tube at my tail end, which I stick up through the surface of the water for air. I usually eat algae and detritus (dee-try-tus) —small pieces of dead plants or animals. As an adult, I fly around and my wings make a buzzing sound. I eat nectar and plant juices, but I need blood from an animal to be able to make my eggs which I lay in the water. Lots of birds and bats eat me.

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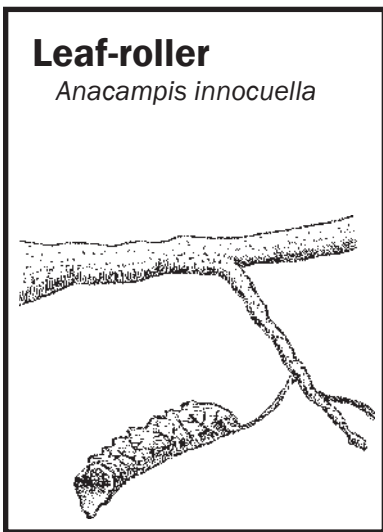
Rio Bravo

I have large hind legs for hopping on the forest floor. My relatives and I mostly eat dead leaves or sometimes small insects. I prefer to live in areas that get flooded regularly, because the leaves are easier to chew. I “chirp” by rubbing my wings together to attract a mate—my song is very familiar on summer nights. My dark colors help me hide in the leaves. Lizards, birds and small mammals often eat me.

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Leaf-roller

Anacampis innocuella



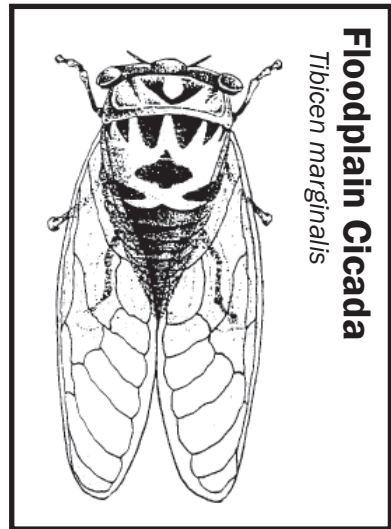
When I am young I have a long body and I crawl around. I have strong jaws for chewing, so I can eat leaves of cottonwood trees. I also roll the leaves and tie them with silk. I hide inside and metamorphose. When I come out I have wings and can fly. It’s easy to find the rolled-up leaves on the ground after they fall out of the trees. Birds often eat me when I’m young.

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Rio Bravo

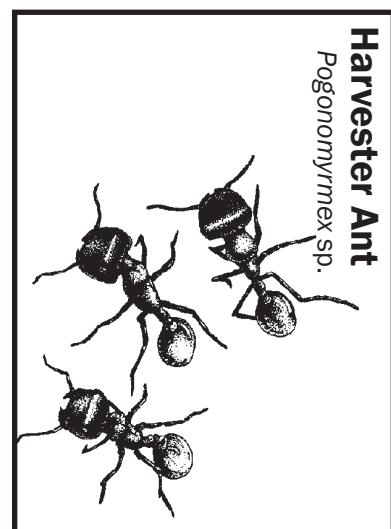
My buzzing call is part of summer. I lay my eggs on twigs in trees; they fall to the ground. My young go underground and suck the juice of plant roots for many months or years. One summer they climb out of the ground and crawl up a tree trunk. There they shed their skin and come out as adult flying insects with big bodies and transparent wings. Many different birds like to eat us.

My buzzing call is part of summer. After I lay my eggs on twigs in trees they fall to the ground. My young go underground and suck the juice of plant roots for many months or years. One summer they climb out of the ground and crawl up a tree trunk. There they shed their skin and come out as flying insects with big bodies and clear wings. Many birds like to eat us.



I live with hundreds of my relatives in underground tunnels. We build a big mound above ground and clear away the plants around it. We live where the ground is dry with nearby grasses, amaranth and mustard plants that have seeds. Often small trails can be seen going out from the nest. We look for food along these trails. We collect small seeds and store them underground. Sometimes we also eat pillbugs that we sting and then carry below ground. We move our young around in the mound to warm or cool them as needed.

I live with lots of my relatives in underground tunnels. We build a big mound above ground and clear away the plants around it. We live where the ground is dry with nearby plants that have seeds. We collect seeds and store them underground. Sometimes we also eat pillbugs that we sting and then carry below ground. We move our young around in the mound to warm or cool them as needed.



Rio Bravo

I live near standing water where I can keep my smooth skin wet. I have a fast tongue for catching flying insects. My long legs help me jump away from turtles and birds that want to eat me. My name comes from the spots on my skin. When I was a young tadpole, I used gills to help me breathe underwater but now I have lungs and can live on the shore. I lay my eggs in the water, attached to plants or to the bottom.

I live near still water where I can keep my smooth skin wet. I have a fast tongue for catching flying insects. My long legs help me jump away from turtles and birds that want to eat me. My name comes from the spots on my skin. When I was a young tadpole I used gills to help me breath underwater but now I have lungs and can live on the shore.



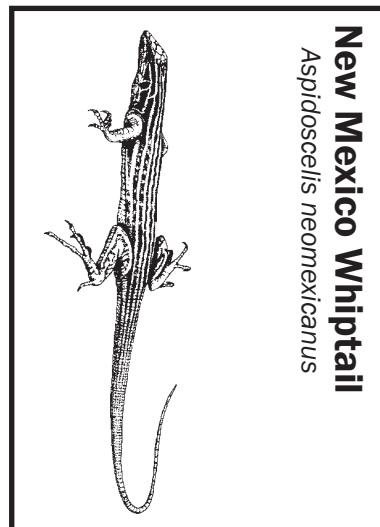
I often sit at night on floating plants with my companions. Our voices join in a trilling song. When danger approaches, I quickly disappear underwater. When I was a tadpole, I lived underwater all the time. Then I ate plants, but as an adult I eat insects. My striped body helps me hide from turtles, birds and mammals. Fish eat my young. In the early spring and fall I am active during the day, but when it gets hot in the late spring and summer I come out at night.

I often sit at night on floating plants with my friends. Our voices join in a song. When danger comes close, I quickly hide underwater. When I was a tadpole, I lived underwater all the time. Then I ate plants, but as an adult I eat insects. My striped body helps me hide from turtles, birds and mammals. Fish eat my young.

Rio Bravo

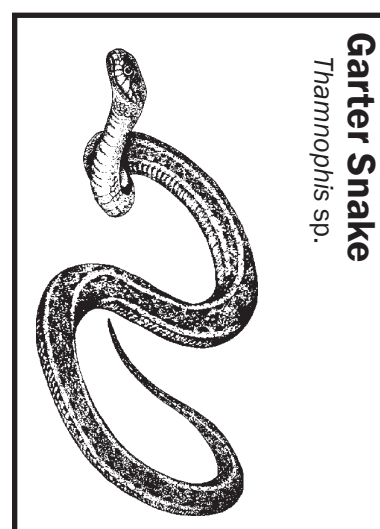
I move very fast on my four legs. I have stripes and light spots along my back. My tail is bright blue when I am young but changes to gray with a gray-green tip when I am grown. I like dry, open areas where I can sit out in the sun. I also seek shade under big trees and shrubs. I sleep through the cold winter. I eat insects and spiders. Roadrunners and other birds like to eat me. I have only sisters, because there are no males of my kind. My young hatch from eggs.

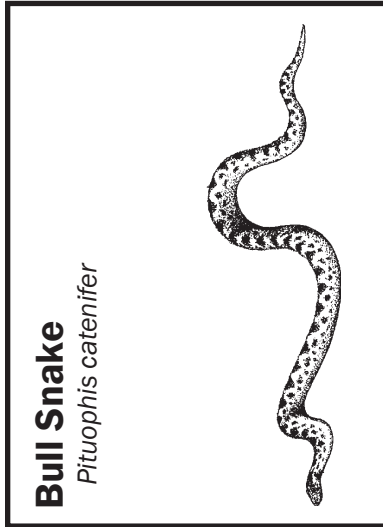
I move very fast on my four legs. I have stripes and spots along my back. My tail is bright blue when I am young. Later it is gray. I like dry, open areas where I can sit out in the sun. I also look for shade under big trees and shrubs. I sleep through the cold winter. I eat insects and spiders. Roadrunners and other birds like to eat me. I only have sisters, because there are no males of my species.



I am a reptile without any legs or arms. I have a long yellowish-white stripe down my back. I eat fish, frogs, toads, tadpoles, lizards and worms. I can dislocate my jaw to open my mouth very wide for large prey. I swim well, but usually I slide along the moist ground under plants. Herons, roadrunners and some mammals try to catch me. If I get caught, I can release a stinky material to scare off the predator. My young do not hatch from eggs—they are born live.

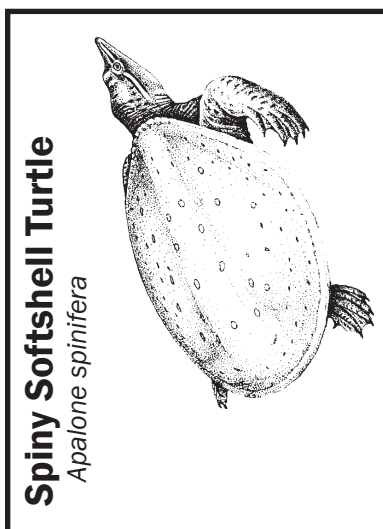
I am a reptile without any legs or arms. I have a long yellow-white stripe down my back. I eat fish, frogs, toads, tadpoles, lizards and worms. I can open my mouth very wide to eat. I swim well, but usually I slide along the wet ground under plants. Herons, roadrunners and some mammals try to catch me.



Rio Bravo

I have a long, slender body with brown and black patches. When disturbed, I shake my tail in leaves on the ground and sound like a rattlesnake. But I do not have a rattle and I am not poisonous. I like to eat mice, rats, eggs, lizards and small birds. I am a constrictor. I squeeze my prey, and then I swallow my food whole. I can even eat prey bigger than my head. I hunt all through the bosque and surrounding uplands. My young hatch from eggs during the summer.

I have a long, slender body with brown and black patches. When upset, I shake my tail in leaves on the ground and sound like a rattlesnake. But I do not have a rattle and I am not poisonous. I like to eat mice, rats, eggs, lizards and small birds. I squeeze my prey, and then I swallow my food whole. I hunt all through the bosque and beyond.



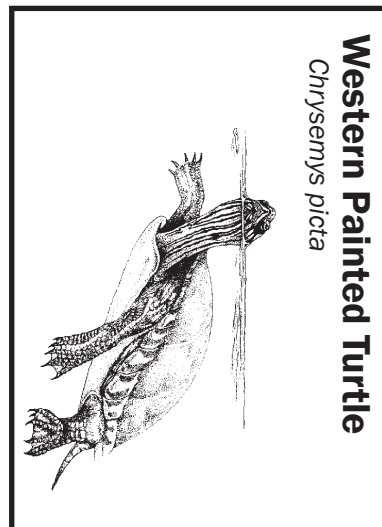
My shell can bend, and it is covered with a leathery skin. My arms, legs and body are flat and my toes are webbed, which helps me swim well. I have a long nose which I stick out of the water for air. I eat earthworms, snails, crayfish, insects, fish, frogs, tadpoles, and some aquatic plants. I like to stay in the river in areas with a sandy bottom and strong currents. On sunny days I like to bask on the river bank or on logs. I am very fast on land and in the water.

My shell can bend, and it is covered with a tough skin. My arms, legs and body are flat and my toes are webbed, which helps me swim well. I have a long nose that I stick out of the water for air. I eat earthworms, snails, crayfish, insects, fish, frogs, tadpoles, and some aquatic plants. I like to stay in the river in areas with a sandy bottom and strong currents.

Rio Bravo

Most of my body stays hidden inside my hard shell. When I am threatened, I also pull in my striped head and legs. I like areas with quiet water, a soft bottom and lots of water plants. In the winter, I stay in mud under water. When it's warm I climb onto mudbanks, logs or rocks to sun myself. Often many of my friends and I share a log to bask. I eat insects, spiders, earthworms, mollusks, crayfish, fish, frogs and tadpoles. As I get older I eat more aquatic plants.

Most of my body stays hidden inside my hard shell. When I am afraid, I pull in my striped head and legs. I like areas with quiet water, a soft bottom and lots of plants. In the winter, I stay in mud under water. When it's warm I like to lie in the sun. I eat insects, spiders, earthworms, mollusks, crayfish, fish, frogs and tadpoles. As I get older I eat more water plants.



Western Painted Turtle
Chrysemys picta

My webbed toes make me a great swimmer but I can also fly to find other places with water. My tail sticks up out of the water when I dip my head below the surface to get food. I have ridges along my bill that let me strain aquatic plants, grass and small insects from the water. I build my nest on the shore. When they hatch, my chicks follow me in a line. Coyotes may try to eat me and raccoons and bullsnakes often eat my eggs.

My webbed toes make me a great swimmer, but I can also fly. When I dip my head below the water to get food, my tail sticks up. I have ridges along my bill so I can strain plants and insects from the water. I build my nest on the shore; when my chicks hatch, they follow me in a line. Coyotes may try to eat me and raccoons and bullsnakes often eat my eggs.



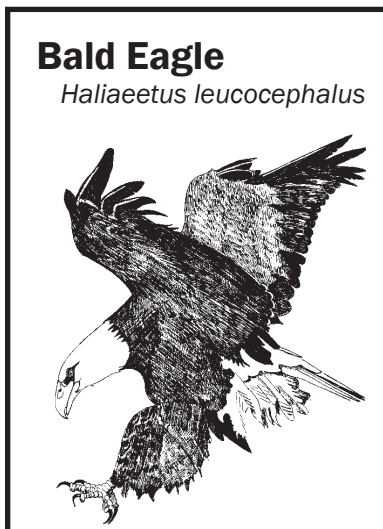
Mallard
Anas platyrhynchos

Rio Bravo



My long neck is dark and I have a white cheek patch, while my body is mostly brownish. My markings help me blend in with the marsh in winter. I am known for my loud “ahonk-ahonk” while I fly in a V-formation with thousands of my kind. I winter in the wetlands where I eat aquatic plants, grasses and some insects and crustaceans. Some of us breed in New Mexico while others head north in the summer. I form a bond with my mate and we breed when we are two or three years old. When our young get a bit older you can see us paddling along with them behind us.

My long neck is dark and I have a white cheek patch. My body is mostly brownish. My markings help me blend in with the marsh in winter. I am known for my loud “ahonk-ahonk” while I fly with my friends. I winter in the wetlands of the Rio Grande watershed. I eat aquatic plants, grasses and some insects and crustaceans. Some of us breed in New Mexico while others head north in the summer.



As an adult, I have a dark brown body with a white head and tail. My massive beak is yellow and I have bare yellow legs. When I am young, my whole body is mostly dark brown with blotchy white underneath. As an adult female my wingspan can reach 8 feet (2.4 meters) while as an adult male it is 6 feet (1.8 meters). My wintering grounds include New Mexico, both along the Middle Rio Grande Valley and the upper reaches of the Rio Grande watershed. I go north to breed. I eat mainly fish that I capture with my huge talons, but I also eat carrion (dead animals). We nest in trees or on cliffs.

As an adult, I have a dark brown body with a white head and tail. My large beak is yellow and I have bare yellow legs. When I am young, my whole body is mostly dark brown mixed with white. I live in New Mexico in the winter. I live along the Middle Rio Grande Valley and in the upper watershed. I go north to breed. I eat mainly fish that I capture with my claws. I also eat dead animals.

Rio Bravo

I am a raptor, which means I have sharp talons (claws) for catching prey and a hooked beak to tear meat. I have a long tail with dark and light brown bands. I hunt during the day. When I am hungry, I wait on a branch for a small bird to fly by. Then I dash after it, using my binocular vision to skillfully fly around the trees. I also eat small rodents, lizards and rabbits. I build my nest of sticks in the fork of a big cottonwood.

I have sharp claws for catching prey and a hooked beak to tear meat. I have a long tail with dark and light brown bands. I hunt during the day. When I am hungry, I wait on a branch for a small bird to fly by. Then I dart after it, and fly around the trees. I also eat other small animals. I build my nest of sticks in the fork of a big cottonwood.

Cooper's Hawk*Accipiter cooperii*

My large eyes help me see well as I hunt at night for mice. My soft feathers help me fly quietly to sneak up on my prey. Some feathers on my head look like horns. During the day I hide in large trees where my feathers match the bark. I often use the old nest of a hawk or crow, or make a nest in a cave or a hole in a tree. My young hatch out during the cold winter but they don't leave the nest until spring.

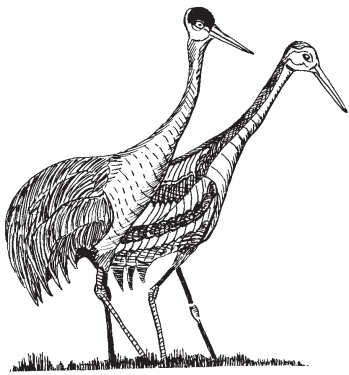
My large eyes help me see well as I hunt at night for mice. My soft feathers help me fly quietly to sneak up on my prey. Some feathers on my head look like horns. During the day I hide in large trees where the color of my feathers matches the bark. My babies hatch during the cold winter but they don't leave the nest until spring.

Great Horned Owl*Bubo virginianus*

Rio Bravo**Great Blue Heron***Ardea herodias*

I use my long legs to wade in the water. Blue-gray feathers cover most of my body, with black on my head. I stand patiently waiting for food to come close. With lightning speed I catch fish, frogs, crayfish, and even mice or gophers, using my large spear-like bill. My long neck helps me grab my prey. I hunt during the day and I usually stay near shore or where there are plants, because that's where my food tends to be. I like to hunt alone, but I build my large nest high in cottonwoods with several others of my kind.

I use my long legs to wade in the water. I stand very still waiting for food to come close. I catch fish, frogs, crayfish, and even mice or gophers using my large pointed bill. My long neck helps me grab my prey. I hunt during the day and I stay near shore or where there are plants, because that's where my food tends to be.

Sandhill Crane*Grus canadensis*

I have a long neck and long legs. My feathers are mostly gray, although sometimes there are rust colored feathers on my back and sides. Red feathers top my head. I live near wetlands along the Rio Grande in the winter. We hang out in large groups in open fields and meadows. We eat whatever we can find, especially insects, small animals and plant parts. In the summer we fly north to breed. When we are nesting, my partner and I sing and dance together. My family flies back to the wintering grounds in the fall.

I have a long neck and long legs. Red feathers top my head, but I am mostly gray and rust. In the winter I live near wet areas along the Rio Grande. My friends and I like to be in large fields. We eat insects, small animals, and plant parts. In the summer we fly north to breed. My partner and I like to dance together.

Rio Bravo

My name is my call. I have two black rings around my neck, brown feathers on my back and a white belly. I run quickly on slender legs along sand bars and river banks. I pick up insects, small water animals or plant parts from the surface of the sand or soil. I lay my camouflaged eggs in a depression on the ground among stones and gravel. If a predator comes near my nest, I pretend to have a broken wing to lure it away.

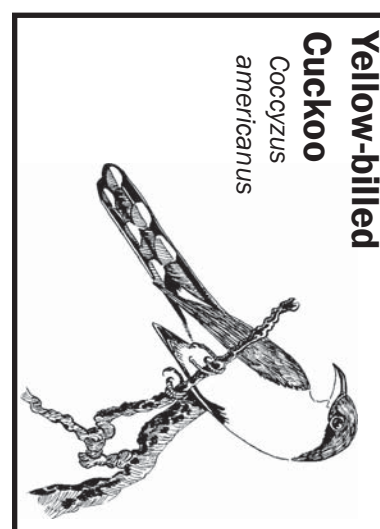
My name is my call. I have two black rings around my neck. I run quickly on skinny legs along the river banks. I pick up insects, small water animals or plant parts from the top of the sand or soil. I lay my eggs hidden by their spotted markings on the ground with stones and gravel. If a predator comes near my nest I pretend to have a broken wing to lead it away.



Killdeer
Charadrius vociferous

My back is grayish-brown, my belly is white, my wings are rufous, and I have white spots underneath my long, dark tail. I have a yellow lower bill. My favorite food is hairy caterpillars, but I also eat other insects, lizards, berries and fruit. I look for food in dense, leafy trees and shrubs. I often breed where there are cicadas, tent caterpillars or other large insects. I typically need large patches of mature riparian woodland with lots of cover to breed. I build my nest of twigs in mature willows. I spend summers in New Mexico and other parts of the U.S., but I fly to South America for the winter.

My back is grayish-brown, my belly is white and my wings are reddish-brown. I have big white spots under my long, dark tail. My lower bill is yellow. My favorite food is hairy caterpillars. I also eat other insects, lizards, berries and fruit. I need large areas of big trees to build my nest. I build it of twigs in big willows. I spend summers in New Mexico and other parts of the United States. In winter I fly to South America.



**Yellow-billed
Cuckoo**
*Coccyzus
americanus*

Rio Bravo

I have sturdy legs, a bushy crest and a long tail. My feathers are streaked, shaggy brown. I can fly but I like to run. My favorite foods are lizards and snakes but I also eat insects, rodents and birds. I hunt in open areas but I build my nest in a low tree or thicket. My husband generally sits on the nest. My mate and I stay together all year. I sing a slow song of low-pitched coos.

I have strong legs, a bushy head and a long tail. I can fly but I like to run. My favorite foods are lizards and snakes, but I also eat insects, mice, and birds. I hunt in open areas but I build my nest in a low tree or thicket. My husband generally sits on the nest. My mate and I stay together all year.

Belted Kingfisher

Ceryle alcyon



I can be recognized by my rattling call as I fly along rivers and streams. I have a large head with a heavy bill. My back has bluish gray feathers and my belly is white. I have a bluish breastband if I am a male and two breastbands—one bluish and one rust—if I am a female. I live up to my name because I have excellent fishing skills. I dive head-first into the water to catch fish. I also eat frogs, lizards, insects, mice and even young birds. If you look along the riverbanks, you may find my burrow that I dig using my bill. I teach my young how to fish by dropping dead meals into the water for them to retrieve.

I can be recognized by my rattling call as I fly along the rivers and streams of New Mexico. I have a large, bushy head with a heavy bill. My back has bluish gray feathers and my belly is white with one or two stripes on my chest. I dive head first into the water to catch fish. I also eat frogs, lizards, insects, mice and even young birds. I dig a burrow into a riverbank using my bill.

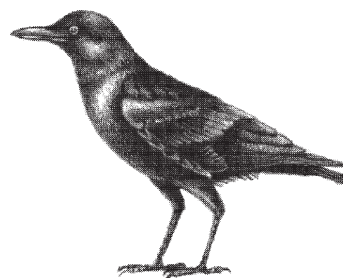
Rio Bravo

I am all black with a big straight beak. My caw caw warns my companions of danger and tells them where to find food. I use different calls to tell my friends different things. We gather together to feed in the bosque during the winter. We eat anything, including animals and plants. At night, we roost together in big flocks in the trees. In the summer most of us head north to build our nests, although some of us stay in the valley to breed.

I am all black with a big straight beak. My caw caw warns my friends of danger and tells them where to find food. We gather together to feed in the bosque during the winter. We eat anything, including animals and plants. At night, we roost together in big flocks in the trees. In the summer most of us head north to build our nests.

Crow

Corvus brachyrhynchos



I perch upright, scanning for insects flying over nearby water. Small feathers around my bill look like whiskers and help me catch flying insects. My back is a brownish color and each of my dark wings has two light stripes on it. I live in dense willow thickets where I build my cup-like nest in the fork of a small tree. I breed in New Mexico but I fly south for the winter.

I sit up straight looking for insects flying over nearby water. Small feathers around my bill look like whiskers and help me catch insects. My back is a brownish color and I have two light stripes on my wings. I live in thick willow patches where I build my cup-like nest in the fork of a small tree. I nest in New Mexico but I fly south for the winter.

Southwestern Willow Flycatcher

Empidonax traillii extimus



Rio Bravo**Summer Tanager***Piranga rubra*

In the summer I dart about in mature cottonwood trees. I am covered with rosy-red feathers. I like New Mexico summers because there are plenty of insects to feed my young. I like to eat bees and wasps as well as fruit. We build our cup-like nests in trees that grow near water. By the time cold weather comes, my young are grown. We all fly south to Mexico or South America where it is warm in the winter.

In the summer I dart about in big cottonwood trees. I am covered with red feathers. I like New Mexico summers because there are plenty of insects to feed my young. I like to eat bees and wasps as well as fruit. By the time cold weather comes, my young are grown. We all fly south to Mexico or South America where it is warm in the winter.

Red-winged Blackbird*Agelaius phoeniceus*

I show the bright red patches in my black wings as I sing loudly from the tops of cattails. My song keeps other males of my kind away from my territory. My wife is dark brown with lots of streaking. We build our nests above the water using stalks of marsh plants. I catch insects to feed my chicks. I travel around in large flocks to search for seeds in winter. Raccoons and some birds eat my eggs, and hawks may try to catch me when I'm older.

I show the bright red patches in my black wings as I sing loudly from the tops of cattails. I build my nest above the water in the cattails. I catch insects to feed my chicks. I travel around in large flocks to search for seeds in winter. Raccoons and other birds often eat my eggs, and hawks may try to catch me when I'm older.

Rio Bravo

I have dark brown fur and a broad flat tail. My webbed feet make me a great swimmer. My favorite food is the inner bark of cottonwood and willow trees but I may also eat buds and fruits. I use my huge front teeth to cut down trees. I prefer young trees but I can cut big ones, too—then I cut off the branches to eat. My family shares a den in the bank of the river. Usually four to eight of my family members live together. We are most active at night. Coyotes, foxes, bobcats and cougars occasionally try to catch us.

I have dark brown fur and a big, flat tail. My webbed feet make me a great swimmer. My favorite food is the inner bark of cottonwood and willow trees but I may also eat buds and fruits. I use my huge front teeth to cut down trees. I dig a den in the bank of the river. I am most active at night. Coyotes, foxes, cougars and bobcats try to catch me.

Beaver

Castor canadensis



I'm smaller than a beaver, and my ribbon-like tail is flattened side to side. I have sleek brown fur. I swim in the river or in a pond and I'm most active at night. When looking for food I can stay under water as long as 20 minutes, but I don't usually stay down that long. I eat aquatic plants, as well as crayfish, fish and other small animals. I make a burrow in the river bank. I usually live alone unless I have babies. I defend my home territory against others of my kind. Raccoons often eat my young.

I'm smaller than a beaver, and my ribbon-like tail is flattened sideways. I have smooth brown fur. I swim in the river or in a pond. I am most active at night. I make a burrow in the riverbank. I eat plants, as well as crayfish, fish and other small animals. I live alone unless I have babies. Raccoons often eat my young.

Muskrat

Ondatra zibethicus



Rio Bravo

I have wings but I am not a bird. My body is covered with brown fur. I use echolocation (sonar) to catch flying insects like mosquitoes. I skim over streams and ponds at night. During the day I sleep in hollow trees or under bark. When we have our babies, I gather with lots of my friends in sheltered areas like caves or cavities of trees. Sometimes I carry my baby with me as I hunt, but we usually leave them together at the roost. I hibernate during the winter.

I have wings but I am not a bird. I have brown fur. I catch flying insects like mosquitoes. I skim over streams and ponds at night. During the day I sleep in hollow trees. When we have our babies, I get together with lots of my friends in sheltered areas like caves or holes in trees. I hibernate during the winter.



I jump like a frog with my long hind feet but I have fur and a tail. My fur is brownish on my back, yellowish on my sides, and white on my belly. I like to stay among wet grasses and under willows. My family lives around marshes. I mostly eat the flowers and seeds of grasses and other plants as well as insects. I hibernate for half the year, living entirely on fat stored in my body. Coyotes, snakes, hawks and owls try to eat me. When a predator, or something else, startles me, I take several long jumps, but then I try to hide again.

I jump like a frog with my long hind feet and tail, but I have fur. I like to stay in wet grasses and under willows. My family lives around marshes. I eat the flowers and seeds of grasses and other plants as well as insects. I hibernate for half the year, living entirely on fat stored in my body. Coyotes, snakes, hawks and owls try to eat me.

Rio Bravo

I am small with grayish or orange-brown fur on my back and sides and a white belly and feet. I am the most common mammal in the bosque. I hide in the day and hunt for food at night. Climbing trees and shrubs is easy for me. I eat insects during the spring and summer, and seeds during the fall and winter. I store nuts and seeds in the fall to eat during the winter. Snakes, coyotes and owls often eat me. My nest is always in a hidden place, maybe a bird's nest, empty burrow or clump of grass.

I am small and brown with white belly fur and feet. I hide in the day and hunt for food at night. Climbing trees and shrubs is easy for me. I eat insects during the spring and summer, and seeds during the fall and winter. Snakes, coyotes and owls often eat me. My nest is always in a hidden place, maybe a bird's nest, empty burrow or clump of grass.



White-footed Mouse
Peromyscus leucopus

My tail, ears and fur are very short. My eyes are small. My front legs are very strong. The claws on my front feet are very long. All of these adaptations help me dig and live underground. I burrow in deep, sandy soil where the trees aren't too close together. I push the soil that I dig out of my tunnels up to the surface and leave it in piles on the ground. My cheeks have fur-lined pockets to carry my food. I eat plant roots and occasionally a whole plant. Sometimes a coyote or badger will try to dig me out of my burrow.

My tail, ears and fur are very short. My eyes are small. My front legs are very strong. The claws on my front feet are very long. These things help me dig and live underground. I dig in deep, sandy soil where the trees aren't too close together. I eat plant roots. I have fur-lined pockets in my cheeks to carry my food. Sometimes a coyote or badger will try to dig me out of my burrow.



Botta Pocket Gopher
Thomomys bottae

Rio Bravo

I have long ears and a short furry tail. When predators like coyotes or hawks are nearby I may freeze or I may use my big feet to hop away. I like to eat grasses in meadows or in open patches in the forest. I am often out during the day, but I prefer to eat at night. I line my nest with fur from my belly. My babies are born with no fur, and their eyes and ears are closed. They grow quickly and can leave the nest after 14 or 15 days. I may have three or four litters a year.

I have long ears and a short furry tail. When coyotes or hawks are nearby, I may freeze or I may use my big feet to hop away. I like to eat grass in meadows or in the forest. I prefer to eat at night, but I am often out during the day. I line my nest with fur from my belly. My babies are born with no fur and closed eyes and ears.



I have a bushy tail, four slender legs, pointed ears that stand up and a sandy brown fur coat. In the mornings and evenings I yip and howl with my family. I eat whatever I can find, including mice, jackrabbits, ducks and other birds, berries and insects. I roam across many miles of the bosque and surrounding fields. Once in a while, I catch a roadrunner. I make a den in a sheltered place like an old animal burrow or a hollow log. My pups stay there for two to three weeks. After six to nine months they may go off on their own, or they may stay with me and my mate until the next year.

I have a bushy tail, four skinny legs, pointed ears that stand up, and a sandy brown fur coat. In the mornings and evenings I yip and howl with my family. I eat whatever I can find, including mice, jackrabbits, ducks and other birds, berries and insects. I roam across many miles of the bosque, and surrounding fields. Once in a while, I catch a roadrunner.

Rio Bravo

My summer coat is reddish but changes to blue-gray in winter and I have a whitish rump patch with a black-tipped tail. My ears are quite large! Males have antlers. I travel from lowland river bottoms to canyons and forested high country. I am most active in the morning, evening and on moonlit nights. I eat leaves, stems and buds of woody plants plus grasses and weeds. I have good eyesight, hearing and sense of smell. These help protect me from predators such as coyotes, mountain lions and bears. When our fawns are born they lie still to hide from predators.

My summer coat is reddish but my fur changes to blue-gray in winter. I have a whitish rump patch with a black-tipped tail and large ears. Males have antlers. I travel from river bottoms to canyons and mountain forests. I eat leaves, stems and buds of woody plants plus grasses and weeds. I have very good eyesight, hearing and sense of smell. Coyotes, mountain lions and bears try to eat me.

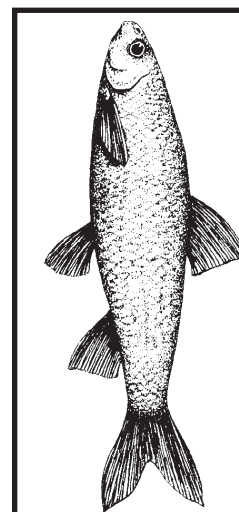
Mule Deer

Odocoileus hemionus



I am a small, silvery animal with fins and scales. I have small eyes. I rarely get longer than 3.5 inches (9 centimeters). I hatched from a floating egg. I eat algae and tiny plant pieces I find floating in the water and on the gooey river bottom. Sometimes I eat old insect skins. I usually travel in large groups called "schools." I prefer slow-moving waters where the river meanders and braids. I release my eggs when the river flow increases during the early spring to summer.

I am a small, silver animal with fins and scales. I have small eyes. I don't get longer than 3.5 inches (9 centimeters). I hatch from a floating egg. I eat algae and pieces of plants and bugs I find floating in the water and on the gooey river bottom. I usually travel in large groups called "schools." I prefer slow moving waters where the river splits in shallow channels.

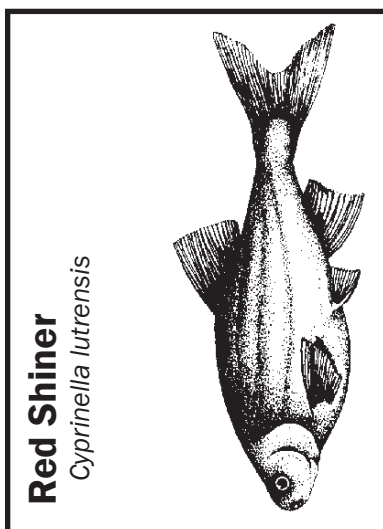


Rio Grande Silvery Minnow
Hybognathus amarus

Rio Bravo

I am a small, shiny animal with fins and scales. My back is pale greenish-brown, and I am about 3 inches (7.5 centimeters) long. I am most known for my flat face, well, it's really just my nose that's flat. I eat tiny plants, bugs, and plant pieces. I like to swim in the slow-moving parts of the river where the bottom is sandy and the water is no deeper than a foot (30 centimeters). The Rio Grande and its tributaries are my only home.

I am a small, shiny animal with fins and scales. My back is pale green-brown, and I am about 3 inches (7.5 centimeters) long. I am known for my flat nose. I eat tiny plants, bugs, and plant pieces. I like to swim in the river where the bottom is sandy and the water is shallow and slow. The Rio Grande and the rivers and streams flowing into it are my only home.



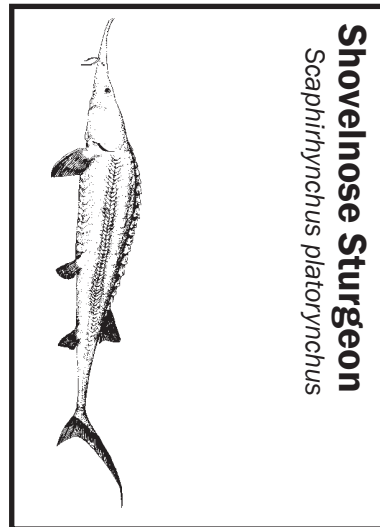
Most of the time my fins and scales are a dull color. My 3-inch (7.5-centimeter) body has an olive back, shiny sides and a white belly. However, when I am fertilizing eggs in spring and summer I have a red head and pink sides. Males of my species defend territories where we lay our eggs. I swim in the Rio Grande, where I prefer deeper, slower water. I eat small animals and plants, such as insects, crustaceans and algae.

Most of the time my fins and scales are a dull color. My 3-inch (7.5-centimeter) body has a dark green back, shiny sides and a white belly. However, when I am fertilizing eggs, I have a red head and pink sides. I swim in the slower water of the Rio Grande. I eat small plants and animals such as insects and algae.

Rio Bravo

I grow to three feet (1 meter) long with a slender body and have rows of bony plates on my back. My nose looks like a shovel. When I eat I stick my extendible mouth out into the bottom of the river. When I pull my mouth back in, I eat the larva of aquatic insects. I live most of my life in the Gulf of Mexico. I usually swim alone in the large channels of the Rio Grande. When I am an adult, I attend a large family reunion, where all adults return to the place we were born to lay or fertilize our eggs.

I grow to 3 feet (1 meter) long with a thin body and rows of bony plates on my back. My nose looks like a shovel. When I eat I stick my mouth out into the bottom of the river to catch food. I eat baby water insects. I usually swim alone. I live most of my life in the Gulf of Mexico. I return to the river where I was born to lay or fertilize eggs.



Shovelnose Sturgeon
Scaphirhynchus platorhynchus



Who Lives Where? cards

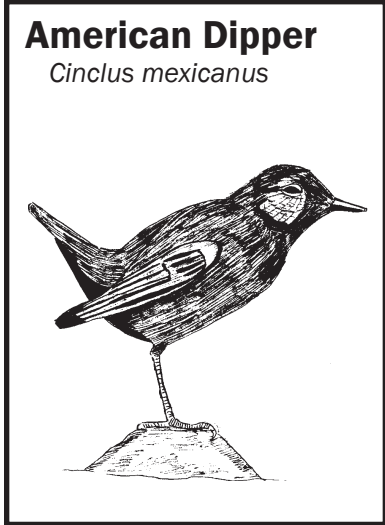
Part 1B: Rio Bravo: Upper Watershed Adaptations: Native

Text for older students top in single-line box, for younger students below in larger type in double-line box.

The following cards are for use with the model set up as Rio Bravo, but for upper watershed locations (upper tributaries or areas north of the Middle Rio Grande Valley.) Use these if your school is located in the upper watershed or if you want to study the upper watershed.

I am small but chunky with slate-colored feathers. Most often I hang out along rushing mountain streams of the upper watershed. I walk along the bottom as I search for caddisfly larvae and other aquatic insects. Sometimes I become completely submerged and I “fly” underwater using my powerful wings. I can even do this in water that is rushing too fast for you to stand in! I have very large oil glands and soft, dense feathers to help keep my body dry. I build my nests behind waterfalls or on rocks in the middle of the stream. You may see me bobbing as I wade and look for aquatic snacks.

I am small but chunky with slate-colored feathers. I hang out along fast mountain streams of the upper watershed. I walk along the bottom as I search for water insects. Sometimes I go all the way underwater and I “fly” using my strong wings. I have large oil glands and soft, dense feathers to help keep my body dry. I build my nests behind waterfalls or on rocks in the middle of the stream.



Rio Bravo

When I am born, I have a white-spotted fur coat and lie still in tall grass to keep predators from seeing me. I weigh 30 to 40 pounds (13–18 kg). I grow up to 1,000 pounds (450 kg) if I am a male and up to 600 pounds (270 kg) if I am female. My adult body is reddish-brown with a short white tail. The males of my species, called bulls, grow huge racks of antlers and are famous for the bugle call used as an advertisement, a battle cry and a mating call. I feed on grasses and enjoy browsing on riparian willows as I migrate from mountain meadows to lowland river valleys.

When I am just born, I have a white-spotted fur coat. I lie very still in tall grass to keep predators from seeing me. My adult body is reddish-brown with a short white tail. The males of my species grow huge antlers and use their bugle call as a battle cry and a mating call. I feed on grasses. I also eat river willows as I migrate from mountain meadows to lowland river valleys.

Elk*Cervus elaphus*

My fur can be black, brown, cinnamon, or blond. As an adult male, I can weigh 250 pounds (113 kg) and as a female I am usually around 150 to 180 pounds (65–80 kg). I like to eat berries, rosehips, nuts, insects and honey. I can smell food from a long distance. I usually stay in the mountains, but I also visit lowland streams and river valleys to look for food, or when young are moving to find their own territories. In the winter, I go into a deep sleep, although I may wake up some from time to time. My cubs are born when I am in my winter den. They stay with me through the next winter.

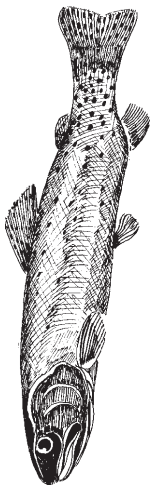
My fur can be black, brown, cinnamon, or blond. I like to eat berries, rosehips, nuts, insects and honey. I can smell food from a long distance. I usually stay in the mountains, but I also visit lowland streams and river valleys to look for food. In the winter, I go into a deep sleep, although I may wake up some from time to time. My cubs are born when I am in my winter den.

Black Bear*Ursus americanus*

Rio Bravo**American Osprey***Pandion haliaetus*

I have long, narrow wings with dark patches at the “wrists,” a dark back, a white underside and a dark stripe through my eyes. I hover high above lakes watching for fish. I can fold my wings and plunge feet-first to scoop up a fish. The best time to see me above New Mexico waters is during spring as I travel north to breed and again in the fall when I fly to southern lands for the winter. I usually mate for life, and my husband fishes for me while I incubate our eggs. As a parent, I am kept very busy fishing for my young. Each chick can eat six pounds (2.7 kg) of fish a day!

I have long, narrow wings with dark patches at the “wrists.” My back is dark and I have a white belly and a dark stripe through my eyes. I hover above lakes watching for fish. I am great at catching fish. The best time to see me in New Mexico is in the spring as I travel north to breed and again in the fall when I fly south for the winter. My mate helps catch fish for our young.

Rio Grande Cutthroat Trout*Oncorhynchus clarki virginalis*

My yellowish-green to gray-brown body is covered with scales and peppered with black spots. During breeding season the male’s belly becomes flaming reddish-orange. I am named for the reddish-orange slash in folds on either side of my lower jaw. I mostly live in headwater streams as I prefer cold, fast-moving waters. I eat aquatic insects and insects that land on the water. As an adult I may also eat small fish. My species was once found in all major watersheds on both sides of the Continental Divide and we were the only species of our kind in many New Mexico waters.

My yellow-green to gray-brown body has black spots. I am covered with scales. Males of my species have a belly that turns reddish-orange. I am named for a reddish-orange slash on the sides of my lower jaw. I mostly live in small, cold streams. I eat water insects and small fish. My species was once the only one of our kind in many New Mexico waters. I lay my eggs from March through July.



Who Lives Where? cards

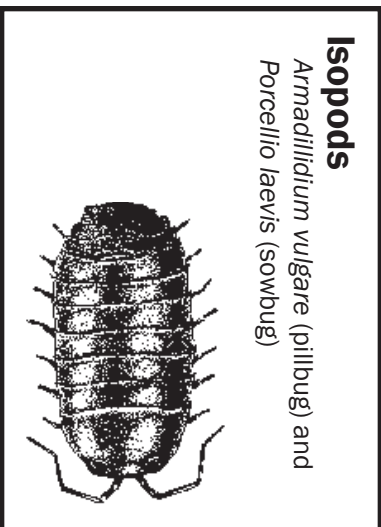
Part 2A: Rio Manso: Animals Introduced to the Middle Rio Grande Bosque

Text for older students top in single-line box, for younger students below in larger type in double-line box.

The following cards are for use with the model set up as Rio Manso, the tamed river. These are animals that did not evolve in this area, but have been introduced into this ecosystem, both intentionally and accidentally. Often, introduced species out-compete native species, especially when the natural environment has been altered. The river is like an island for the natural species that live there—a long narrow island. They cannot live far from the wet riparian environment. In this restricted area, introduced species and habitat destruction have a great impact. By destroying habitat, the narrow bosque area is cut into smaller pieces that support fewer and fewer native species.

I have 14 legs! I may roll into a ball to protect myself. I live on the forest floor among the leaves as crickets do. I eat dead leaves, leaving behind the “skeleton” of the leaf. Sometimes I eat animal scat (that’s the word biologists use for “poop”!). Harvester ants may catch me, kill me, and carry me down into their burrow. Other small animals may eat me too. We arrived in the U.S. as unplanned cargo in ships from Europe and have spread here, taking over the role crickets had.

I have 14 legs! I may roll into a ball to protect myself. I live on the forest floor. I eat dead leaves, and sometimes I eat animal scat (that’s a word for “poop”!). Harvester ants may catch me, kill me, and carry me down into their burrow. The ants may leave pieces of my white shell near their mound. Other small animals may eat me, too.



Rio Manso**Bullfrog***Rana catesbeiana*

I am the biggest frog in North America. I didn't always live in the Rio Grande Valley. I was brought here because my legs are so good to eat. I live in still waters of marshes or ponds where native frogs once ruled. I eat insects and any animal small enough for me to swallow, including ducklings. I need two summers to grow from an egg to a tadpole and on to a full-grown frog.

I am the biggest frog in North America. I didn't always live in the Rio Grande Valley. I was brought here because my legs are so good to eat. I live in marshes or ponds where native frogs once ruled. I eat insects and any animal small enough for me to swallow, including ducklings. I need two summers to grow from egg to tadpole and on to a full-grown frog.

**Mosquitofish***Gambusia sp.*

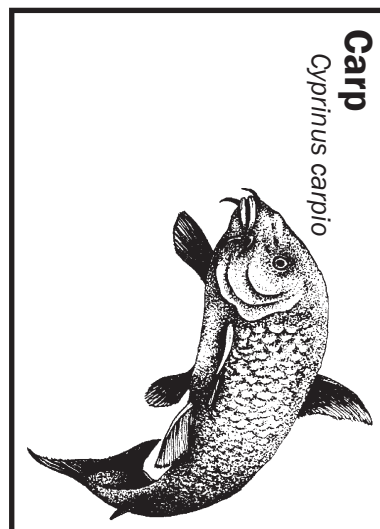
Look for me in warm, shallow water with many plants. I am 2 inches (5 centimeters) long and my mate is only 1 inch (2.5 centimeters). I am native in the lower Rio Grande but was introduced to the Middle Rio Grande because I eat mosquito larvae. My babies are born alive. I also eat other insect larvae, algae, crustaceans, and fish fry (baby fish). Because I eat fish fry, I sometimes kill off the fish that were in the streams and rivers before I came.

Look for me in warm, shallow water with many plants. I am 2 inches (5 centimeters) long and my mate is only 1 inch (2.5 centimeters). I am native in the lower Rio Grande, but was introduced to the Middle Rio Grande because I eat mosquito larvae. My babies are born live. I also eat other insect larvae, algae and baby fish.

Rio Manso

I am a fish that people in the United States do not usually eat. I came to New Mexico in 1883. I enjoy quiet, warm water but I can live in almost any kind of water. I often change the habitat by uprooting plants, making the water muddy, and eating the eggs of other fish. I spoil the habitat for native fish. I have barbels that look like whiskers. Some people think I am a pest.

I am a fish that people here do not usually eat. I enjoy quiet, warm water but I can live in almost any kind of water. I often change the habitat by pulling plants, making the water muddy and eating the eggs of other fish. I spoil the habitat for native fish. It looks like I have whiskers. Some people think I am a pest.



I am a small brown bird with a short, cone-shaped bill. My European relatives were brought to New York in 1850 and by 1940 were in the Rio Grande Valley. I have successfully colonized here because I strongly claim cavities for my nests very early in the year, before other birds arrive. I am common around houses and buildings but not very common in the bosque itself. I eat food on the ground, mostly insects, worms, garbage and seeds.

I am a small brown bird with a short, cone-shaped bill. I came from far away but have been very successful in the Rio Grande valley—just look how many of us there are! I build my nest in places very early in the year, before other birds arrive. I am common around houses and other buildings. I eat food on the ground, mostly insects, worms, garbage, and seeds.

House Sparrow*Passer domesticus*

Rio Manso**European Starling***Sturnus vulgaris*

In the fall my black feathers are tipped with white and tan, but in the breeding season my plumage is iridescent black. I have a stocky body and a short, square tail. I can make lots of different sounds and imitate the songs of other species. I eat insects and other invertebrates, fruits and seeds. My ancestors came from Europe, but people took some of them to New York in 1890-91. Soon we spread across the U.S. We can live in many places. We nest in holes and often out-compete native species for nesting sites because we are aggressive and there are many of us.

In the fall my black feathers are tipped with white and tan. They show many colors in the breeding season. I have a stocky body and a short, square tail. I eat insects, fruits and seeds. My kind originally came from Europe. We like many types of habitats. We nest in holes. We take many of the nesting sites so native species can't use them. We often hang out in large flocks.

House Mouse
Mus musculus

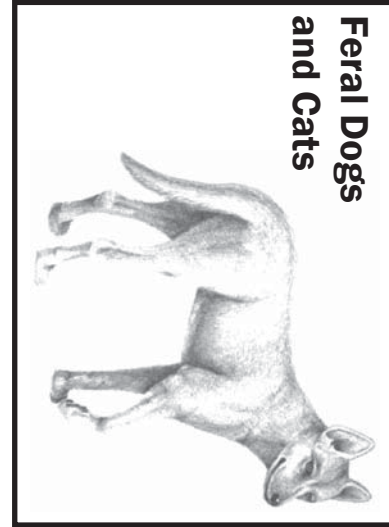

I have gray-brown fur, top and bottom. My scaly tail has little hair on it. My ancestors probably arrived in North America with the first colonists. I do well in areas near humans. I move inside buildings when it gets cold. I usually have four or five young in a litter and they, in turn, can have young six weeks later. I have several litters a year. I eat vegetable matter and bugs.

I have gray-brown fur, top and bottom. My scaly tail has little hair on it. I like to live near humans. I move inside buildings when it gets cold. I usually have four or five young in a litter. They can have young when they are only six weeks old. I eat vegetable stuff and bugs.

Rio Manso

I should be a pet, but I am wild. Since I was abandoned by humans I try to survive on my own. I find lizards and mice to eat. I usually find the native mice are slow and easy to catch. Birds like ducks and quail that nest on the ground can also provide a good meal. I have become afraid of humans so I roam at night looking for food.

I should be a pet, but I am wild. Since humans left me here alone, I try to survive on my own. I find lizards and mice to eat. The native mice are slow and rather easy to catch. Birds that nest on the ground also provide a good meal. I am afraid of humans so I roam at night looking for food.





Who Lives Where? cards

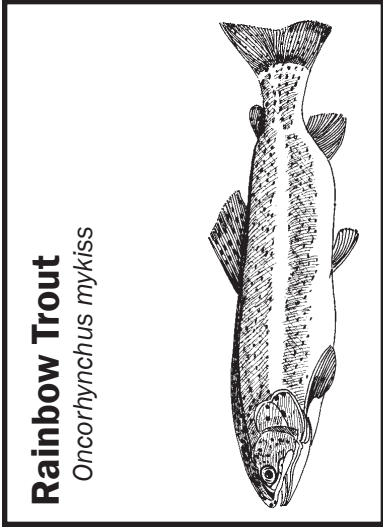
Part 2B: Rio Manso: Upper Watershed Adaptations: Introduced

Text for older students top in single-line box, for younger students below in larger type in double-line box.

The following cards are for use with the model set up as Rio Manso, the tamed river, for upper watershed sites (upper tributaries or areas north of the Middle Rio Grande). Use them if your school is located in the upper watershed or if you want to study the upper watershed.

I have a dark back, polished silvery sides, a red band along the lateral line, shimmers of green and blue in the sunlight and black specks from head to tail. I am almost every color of the rainbow! I have been transplanted from my home waters in the Pacific Northwest. I prefer clear, cold water with plenty of dissolved oxygen and many places to hide. In New Mexico I live in the tributaries of the Rio Grande as well as in several cold mountain lakes. I catch insects in the water or near the surface.

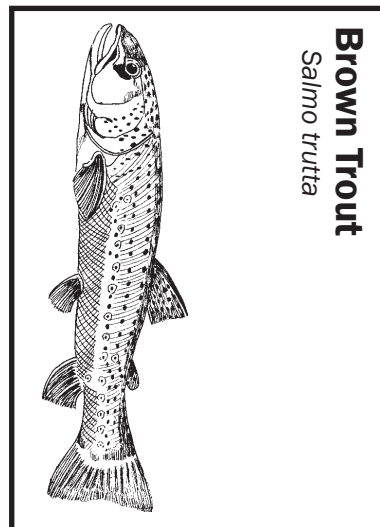
I have a dark back and a red band along my silvery sides. Green and blue colors show in the sunlight and I have black dots from head to tail. I am almost every color of the rainbow! I came here from my home waters in the Pacific Northwest. In New Mexico I live in cold, smaller streams that flow into the Rio Grande. I also live in some cold mountain lakes. I catch insects in the water or near the surface.



Rio Manso

I have a sleek, colorful olive-brown body that sparkles with gold. My upper sides are dotted with black and sprinkled with blue-haloed red and orange spots, although my tail has no spots. I live in coldwater streams and lakes, but I prefer deeper, slower and warmer streams than other species like me. I eat minnows and aquatic insects. My species was introduced to North America in 1883. Now I am commonly found throughout the US, including some tributaries of the Rio Grande. I am wary and difficult to catch. I hide under a log or in a rock crevice when startled.

I have a sleek and colorful olive-brown body that sparkles with gold. My upper sides have lots of black, bluish-red and orange spots. I live in small to large coldwater streams and lakes. I eat minnows or water insects. My species was brought to North America in 1883. Now I live in some of the smaller streams of the Rio Grande watershed. I hide under a log or behind a rock when scared.





Threatened and Endangered Animals

An endangered species is an animal or plant that may very soon go extinct. When extinct, every one of that species is gone; not one is alive anywhere. That species is gone from the Earth forever. The term “extirpated” is used when a species no longer occurs in a given locality, such as the Middle Rio Grande Valley, but still survives in other places (also referred to as “locally extinct.”) A threatened species is reduced in numbers and is on its way to becoming endangered and then going extinct. The purpose of listing a species as threatened or endangered is to restore the species to a point where its populations are stable and no longer in need of special protection. The federal Endangered Species Act offers protection both for a listed species directly and for the ecosystems or habitats on which it depends.

The federal government, through the United States Fish and Wildlife Service, lists species as threatened, endangered or extinct. The state government, through the New Mexico Game and Fish Department, makes its own list of state endangered, threatened or extinct species. Some species may appear on one list and not the other, or they may be on both lists. The New Mexico Natural Heritage Program, a program within the Biology Department at the University of New Mexico, also ranks plant and animal species, and plant communities, as to their endangerment status and monitors these species closely.

Fifty percent of fishes native to the Middle Rio Grande Valley are no longer here. Many things have contributed to this local extinction: pollution, reduced water flow, dams, increased erosion on land leading to more sediment in the water, and introduction of non-native fish species.

Some interesting fish had life cycles that included living in the freshwater Rio Grande and over 1,500 miles (2,400 km) away in the Gulf of Mexico. The American eel and freshwater or sheepshead drum are no longer found in New Mexico due to the dams and diversion structures in the Rio Grande. The **American eel**, *Anguilla rostrata*, spawns at sea, in the Sargasso Sea to be exact. The females travel up freshwater rivers and can live for 50 years before making the trip out to the ocean. The males stay in the ocean and near shore areas, but when females arrive they travel in groups, along the sea floor, to the spawning area where they mate and die. It takes three years for the young to get back to fresh water. Today eels are still in the Mississippi River valley having been found as far upstream as North Dakota and other rivers of the eastern Atlantic and from Greenland to Brazil. The **freshwater drum**, *Aplodinotus grunniens*, today lives primarily in the salt–fresh-water mixed zone of the mouth of rivers. It still comes up the Rio Grande a short ways, but cannot make it very far. Remains have been found in archeological sites in the Middle Rio Grande Valley—evidence that drum made up a significant component of the fishery of the pre-alteration Middle Rio Grande.

The following species are in the “Who Lives Where?” bosque animal activity and are currently (or have been in the past) threatened, endangered or extinct.



Rio Grande Silvery Minnow, *Hybognathus amarus*

federal: endangered state: endangered

The silvery minnow was placed on the federal endangered species list in 1994. Today you can find this minnow swimming only in the river between Cochiti Dam and Elephant Butte Reservoir, particularly in the more southern reaches. It is endangered because of poor water quality, changes in the structure of the riverbed, and lack of water in the river due to irrigation and drought. The minnows lay eggs with the peak spring flows, and the young develop in quiet backwater areas after overbank flooding. (See Chapter 2, Introduction, for more information.)

Rio Grande Bluntnose Shiner, *Notropis simus simus*

considered extinct

Last collected in 1964 near Pena Blanca. Extinction suspected as a result of its habitat periodically drying up due to water diversions, dams, and drought (loss of spawning sites by desiccation), and possibly competition with introduced species. The **Pecos bluntnose shiner** (*Notropis simus pecosensis*) is listed as a federal and state threatened species.

Shovelnose Sturgeon, *Scaphirhynchus platorhynchus*

extinct in New Mexico (extirpated)

Only one voucher specimen of this fish has been found in New Mexico (in 1875); however, archaeological evidence indicates the fish was eaten in earlier times. One theory to explain this fish's early extinction in New Mexico relates to the sturgeon's reproductive habits. Since adult fish return to their birthplace to reproduce, any changes to that one spot (such as removing water for irrigation) would affect the entire population of shovelnose sturgeons.

Northern Leopard Frog, *Rana pipiens*

All five species of leopard frogs in New Mexico are being carefully monitored. The northern leopard frog was listed on the Navajo Endangered Species List as "threatened" in 1997 but has not been placed on state or federal lists even though many local populations have been lost. Although scientists are not sure exactly why leopard frogs have declined dramatically, many suspect that competition with and predation by introduced bullfrogs or predation by introduced fish may be major factors. Other reasons leopard frogs may be declining are damage to their habitat, pollution, and commercial harvesting.

Greater Sandhill Crane, *Grus canadensis*

Although not currently listed as endangered or threatened, greater sandhill cranes were rare in the 1930s primarily due to loss and degradation of wetland habitats. The Bosque del Apache National Wildlife Refuge was established in 1939 in part to provide wintering habitat for greater sandhill cranes, and now populations have recovered enough that the species is no longer considered endangered. The **whooping crane** (*Grus americana*) is listed as endangered at the state level.



Bald Eagle, *Haliaeetus leucocephalus*

federal: threatened state: threatened

Once widespread throughout the United States, a decline in the southern and eastern parts of the bald eagle's range in the 1900s led to its federal listing as endangered. A ban on DDT helped populations recover and by mid-1995 it was down-listed to threatened. By 1999 it was proposed for delisting since populations appear secure. Major threats remain, however, including habitat loss, disturbance by humans, chemical contamination, decreased food supply and illegal shooting.

Yellow-billed Cuckoo, *Coccyzus americanus*

federal: candidate state: not listed

Yellow-billed cuckoos are considered a candidate species at the federal level, which means there is enough information on potential threats and the vulnerability of the species to propose listing as endangered or threatened. In the west, yellow-billed cuckoos nest in riparian woodlands with tall cottonwoods and willows. The local subspecies needs large patches of dense riparian forest with fairly dense understory to nest, so it is particularly affected by loss and degradation of habitat.

Southwestern Willow Flycatcher, *Empidonax traillii extimus*

federal: endangered state: endangered

The southwestern willow flycatcher was listed as endangered at the federal level in 1995 and at the state level in 1996. It nests in dense willows that overhang wetland habitat. This habitat has been dramatically reduced in the last few decades. When the river was straightened, wetland areas were drained for agriculture. Wetlands were also reduced by the loss of spring flooding. Another contributing factor to the southwestern willow flycatcher's decline is parasitism by brown-headed cowbirds. Cowbirds lay their eggs in the nests of other birds, leaving those parents to raise the cowbird chicks. Cowbird eggs hatch earlier than the residents' eggs, and nestlings are generally bigger and stronger. Cowbird chicks are more aggressive and out-compete others for food. Although native, brown-headed cowbirds expanded their range with the clearing of forests and the introduction of cattle. They have had a dramatic effect on many species in the Southwest.

Little Brown Bat, *Myotis lucifugus occultus*

federal: candidate for listing state: not listed

The little brown bat is currently not listed but the local subspecies is considered vulnerable and is being tracked. This bat forages over open water and needs roosting sites close to open water. Its decline is thought to be related to a loss of roosting sites.

Meadow Jumping Mouse, *Zapus hudsonius luteus*

federal: not listed state: threatened

This mouse lives in marshlands and wet meadows. Its numbers declined when marshes and meadows were drained in the 1930s. Today, the areas where they are found are far from each other and are only small patches of habitat. They often now live along ditches or drains with willows and other vegetation.



Introduced and Non-native Species

In the Middle Rio Grande Valley, there are many species that have only recently taken up residence. These plants and animals are taking over areas that native species have lived in for thousands of years. There are many reasons that non-native species may be successful, but in general they arrive here without the animals or plants adapted to eat or compete with them in their native environment.

Introduced Plants

There are three introduced trees that are very common in parts of the Middle Rio Grande Valley: tamarisk/saltcedar (*Tamarix chinensis*), Russian olive (*Elaeagnus angustifolia*), and Siberian elm (*Ulmus* sp.). In general they are increasing because human-caused changes in the river valley provide favorable conditions for them to grow.

Tamarisk trees flower and produce seeds throughout the growing season; their reproduction is not restricted to spring/early summer as are native cottonwoods. When bare ground is colonized late in summer by tamarisk, it will not be bare in the spring when cottonwoods are sending out seeds. Both Russian olive and Siberian elm can sprout in shaded areas, under the canopy of the cottonwoods, and are becoming very common in the bosque.

Fires in the bosque are much more common today than in previous centuries. Human-caused fires from factors such as fireworks destroy many acres of the bosque each year. Cottonwoods can survive low- to moderate-severity fires, and can re-sprout after high-severity fires, but survivorship of the above-ground tree tends to be low after high-severity fires. Although the sprouts can grow quickly, it takes some time before they are able to produce seed. Both tamarisk and Russian olive can re-sprout after fires, while above-ground parts of the plants tend to be killed. These species, however, often can reestablish after fires more quickly than cottonwoods with new seeds coming from plants off the burned site, since they produce seeds for a longer period than do cottonwoods. Also, tamarisks that survive a fire can increase flowering and seed production, again giving it an advantage in re-establishment over cottonwoods.

Cavity-nesting birds (such as nuthatches, chickadees, and woodpeckers) are an important part of the bosque ecosystem. They use the large cottonwoods to build their nests, but they have not been seen nesting in tamarisk or Russian olive. These introduced trees do not provide suitable cavity sites. If the number of native trees in the Rio Grande bosque continues to decline while introduced tree species increase, we may see a change in some of the wildlife along our river corridor.



Introduced Fauna

Arthropods

The isopods, commonly called pillbugs (*Armadillidium vulgare*) and woodlice (*Porcellio laevis*), were brought to this continent in the holds of ships. Ships carried dirt as ballast on their trips to North America, but then dumped the soil to load cargo bound for Europe. Isopods spread from these deposits. In the Rio Grande Valley the isopod has become the major detritivore (eater of dead plant material). Crickets filled this role before, but are now reduced in numbers. Crickets do well in areas that receive spring flooding, but isopods tend to be more numerous in drier sites.

Amphibians

Although native to the eastern U.S., it is unknown whether bullfrogs (*Rana catesbeiana*) are native to New Mexico. They were introduced throughout the west to provide a source of frog legs for people to eat, and this is probably how they got into the Middle Rio Grande. Bullfrogs are large frogs that eat almost anything they can capture and swallow, even ducklings! They are known for eating other frogs and have been blamed for the decline of several species. The northern leopard frog may have declined in part due to predation by bullfrogs.

Fish

Non-native fishes have been introduced to the Middle Rio Grande both accidentally and by intentional Game and Fish stocking programs. There has been a corresponding reduction in the numbers and distribution of native fishes as the new species compete for food or prey directly on native species. In some cases an introduced relative is hybridizing with the native species. Species of mosquito fish have been introduced to control mosquitoes in the valley, as some mosquito fish eat mosquito larvae. The installation of Cochiti Dam has changed the temperature of the water and the amount of water released downstream throughout the year; those conditions change the fish able to survive in the reach below the dam.

Birds

European starlings (*Sturnus vulgaris*) were introduced into Central Park, New York City in 1890; by 1952 they were found across the United States. They primarily eat insects but also eat seeds and scavenge garbage. They nest in cavities and so compete directly with native cavity-nesting birds. Starlings nest early in the year and are very aggressive about claiming nest holes. They even evict the large woodpeckers that excavated the hole! Many species of birds are now reduced in numbers due in part to competition from starlings.

House sparrows (*Passer domesticus*) were introduced to St. Louis in 1875 from England, after initial introductions in the 1850s to Brooklyn died. By 1940 they had spread throughout the United States by nesting in boxcars. They live in and around buildings, close to humans. Like starlings, house sparrows start nesting earlier in the year than native birds and so can claim prime nesting habitat (they nest in cavities but can also build a bulky nest in dense vegetation). They may even appropriate nests of other birds, killing eggs and nestlings if occupied. House sparrows tend to have several broods a year.



Mammals

House mice (*Mus musculus*) move along with humans into an area. They have large numbers of young that can reproduce when only two months old. Although they are not common in bosque sites away from the city, in the Albuquerque bosque they are often captured in areas of dense vegetation, especially near water. They do not tend to be in areas of mature cottonwoods. With more human development in or near the bosque, and a shift in vegetation, house mice will likely spread into more areas. The Norway rat (*Rattus norvegicus*) was also introduced to the valley and is found in agricultural areas, but is not very common in the bosque.

Feral cats eat native rodents and birds. They also eat native lizards, and have caused a dramatic decline in the local lizard populations. Feral dogs roam in packs and eat many native species. They easily destroy ground-nesting birds such as ducks and geese.

Summary

Introduced and non-native species have had, and continue to have, a great impact on the native plants and animals of the Middle Rio Grande bosque. Many of these introductions happened years ago. The people releasing the animals or bringing in the plants did not know the effects they would have. It is with hindsight that we wish some of these species had not been brought here. Today, we should not repeat the mistakes of the past. Do not release unwanted pets into the bosque. An unwanted kitten or puppy should be taken to Animal Control or the Humane Society. Don't vacation in another state and bring home a wild animal, such as a turtle for a pet, then let it go in the bosque when you can't take care of it any more. We have a rich and diverse population of plants and animals particularly adapted to the Middle Rio Grande Valley. We should work hard at learning about the natural ecosystem and keeping our native species with us.