

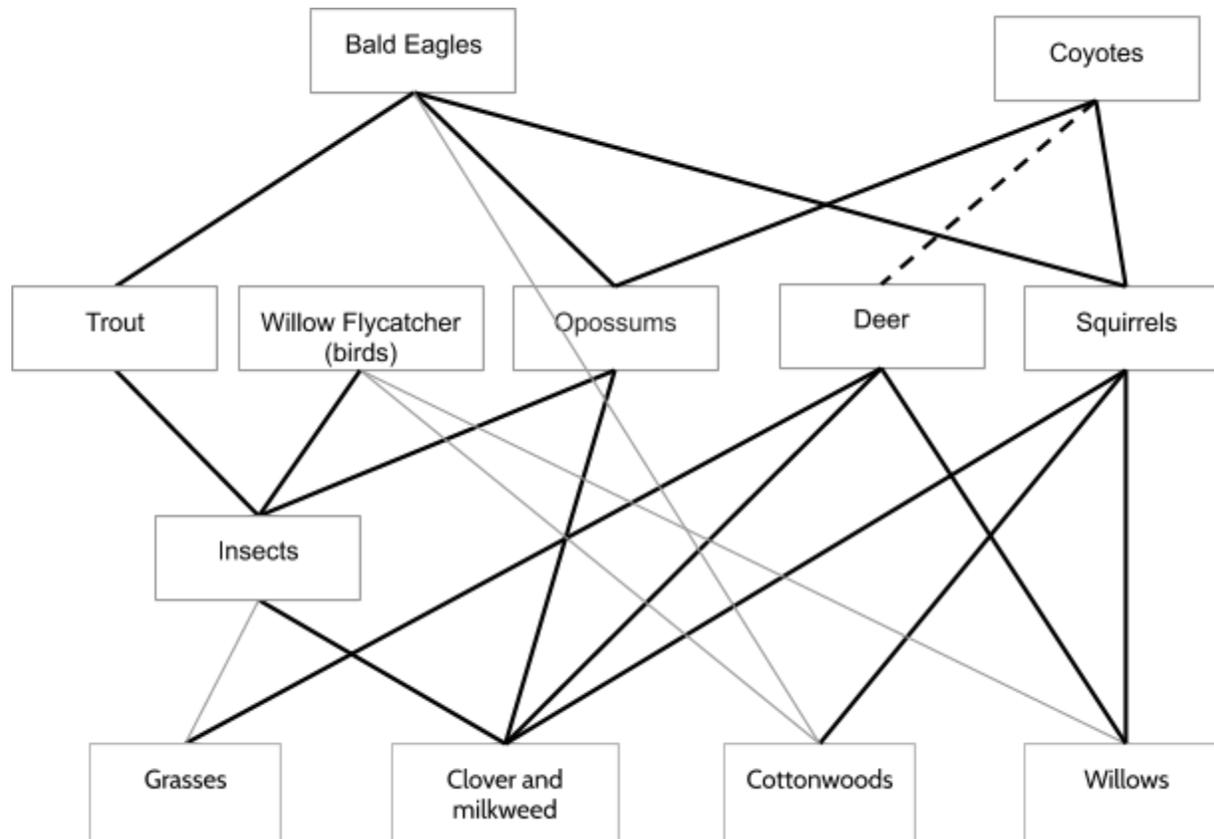
Lesson 13: Answer Key

Key: Changing Populations in Riparian Ecosystems Assessment Scoring Guidance

In the state of Colorado, almost all of the birds, fish, and wildlife species (90%) need habitats near waterways to survive. Ecosystems along creeks, rivers, and other water are called riparian ecosystems. Riparian ecosystems include all of the plants and animals that live in or near the waterway. Below is a model that depicts the components and interactions between only a few populations that live there.



Riparian ecosystem in Colorado



KEY

- Squirrel Component
- black ——— Food interaction
- gray ——— Shelter/protection interaction
- - - - - Weaker interaction
- Stronger interaction
- +** Benefits
- Harms
- ↓ Population decrease
- ↑ Population increase

1. Cottonwood trees and willow plants are essential plants in the riparian ecosystem. Use the model of a Colorado riparian ecosystem below to explain why these two plants are essential to the health of the ecosystem.

- + Both plants have a lot of connections (interactions) with other populations.
- + Willows and cottonwoods provide food for squirrels and deer.
- + Willows and cottonwoods provide shelter and protection for bald eagles and flycatchers.

2. When there is a drought, fewer clover and milkweed plants survive. Use the model to explain how competition between populations is impacted during a drought.

- + There is more competition overall because there is less food.
- + There is more competition between opossums, squirrels, deer, and insects.
- + Opossums may be more greatly impacted because their own food sources are traced back to clover and milkweed.
- + The interactions between the clover/milkweed and other populations will become weaker.

3. Farmers need water from these ecosystems. In some years, farmers use so much water that there is not enough water in the streams and rivers, and many trout die. Use the model above to predict what will happen to the bald eagle populations when too much water is used by farmers.

- + The eagles will have less food because there are fewer trout available.
- + The interaction between the eagle and the trout will become weaker.
- + The interaction between the eagle and the squirrels and opossums will become stronger.

4. Invasive plants are plants that are new to an area and take over the land. They cause damage to other plants and animals and are a major disruption happening in Colorado riparian ecosystems.

Invasive Plants Replacing Willows and Cottonwoods



Russian olive tree

Russian olive trees and tamarisk shrubs are taking over where willows and cottonwoods used to grow. The new plants grow close together, so there is no space for willows and cottonwoods to grow. The new plants need a lot of water to grow, leaving very little water for other plants. Their leaves are not nutritious food options. The Russian olive trees and tamarisks are not as good habitat options as willows and cottonwoods.

Use the model to predict what impacts the new plants will cause to the ecosystem if the disruption continues by completing the diagram below.



5. Before the tamarisk plants were introduced the willow flycatcher, a bird, built its nests in willow plants. When the tamarisk was introduced in Colorado, the willow flycatchers needed to find a new place to build nests. They started using the tamarisk plants to build nests. Here is a model of the ecosystem once tamarisks were growing in place of willows.

In 2001, in order to slow the spread of the tamarisk plants and protect the ecosystem, scientists began releasing tamarisk beetles in Colorado. The beetles only eat tamarisk plants, and, when they eat the plants, they kill them or slow down their growth. The willow does not grow back in the first year.

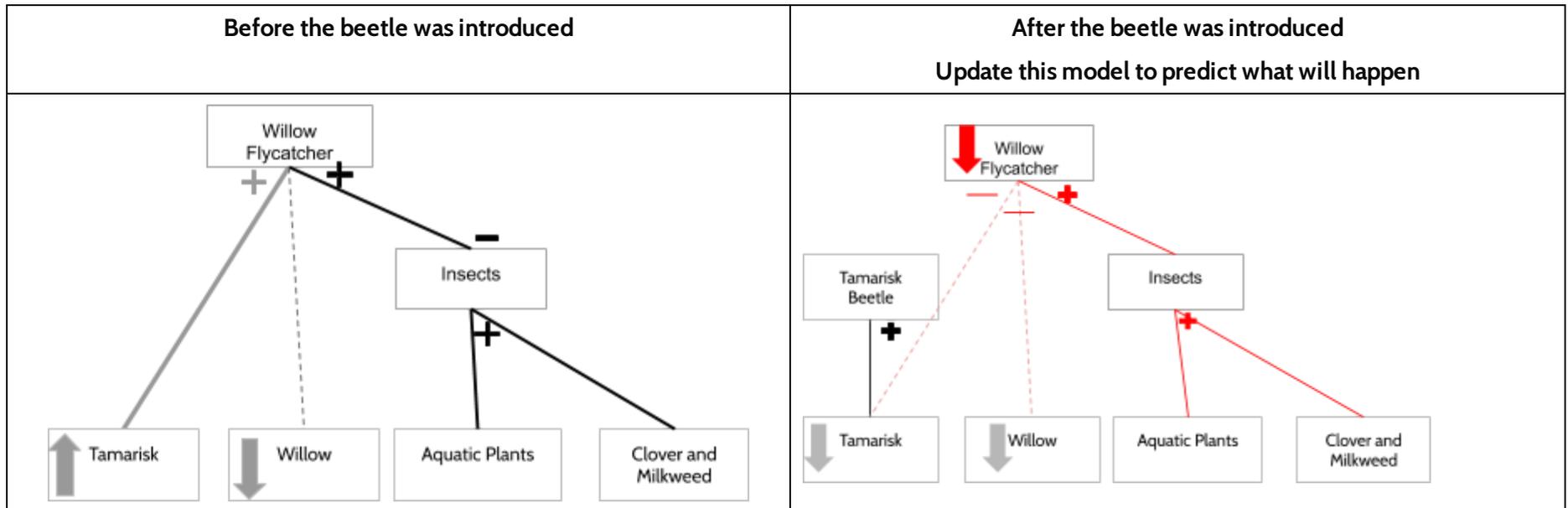
Update the model on the right side of the table below to predict what will happen to the willow flycatcher population in the first year that the beetles are introduced.



Willow Flycatcher



Tamarisk Beetles



Look for students' additions to the models as shown above. Pink shows shelter relationships that students should have in their models. Red shows food relationships that students should have in their models and the symbols they should include.