Oh, What a Tangled Web…
an activity exploring food webs

In one hectare of an ideal Texas forest (or, about the same area as half of a city block), we would find:

1	American kestrel
15	copperhead snakes
300	green anole lizards
1,400	crickets

These animals form a simple food web, shown in Figure 1. We're going to use a math model today to collect evidence on how organisms in a food web are related to each other. In this model, we'll compare two scenarios. The first scenario will show us what happens in a healthy forest, and the second scenario will show us what happens when one of the species in the food web is eliminated.
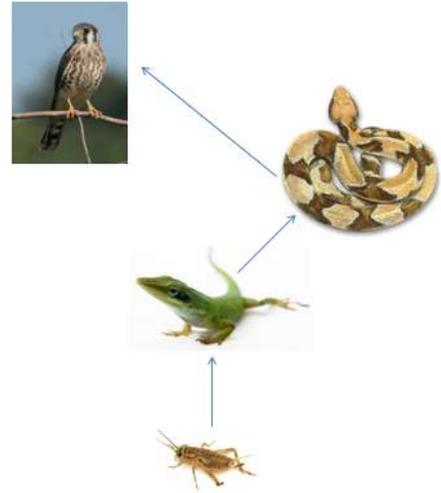
Figure 1. A simple food web in which kestrels eat copperheads, copperheads eat anoles, and anoles eat crickets.

1. Scenario 1: Our one hectare forest has 15 copperheads, the number we would expect to find if the forest is healthy. Each kestrel in the forest eats 10 copperheads a year.

How many copperheads do we start with? _____

How many copperheads are eaten during the year? _____

How many copperheads would remain in the forest at the end of the year? _____

Every copperhead remaining in the forest eats 15 green anoles each year.

How many anoles do we start with? _____

How many total anoles are eaten during the year? _____

How many anoles would remain in the forest at the end of the year? _____

Scenario 2: One hectare isn't quite enough land to support a kestrel, so the kestrel died during the first year, without eating any copperheads.

How many copperheads do we start with? _____

How many copperheads are eaten during the year? _____

How many copperheads would remain in the forest at the end of the year? _____

Every copperhead remaining in the forest eats 15 green anoles each year.
How many anoles do we start with? _____
How many total anoles are eaten during the year? _____
How many anoles would remain in the forest at the end of the year? _____

2. In your own words, describe the difference between a forest food web that includes a kestrel, and the food web that does not include a kestrel.

3. In the space below, draw a column graph showing the number of anoles in this forest with a kestrel, and the number of anoles in the forest with no kestrel.

4. Now, let's think about the number of crickets in the forest in Scenario 1 (with a kestrel) and the forest in Scenario 2 (with no kestrel).
Would you predict that there would be more crickets in Scenario 2, fewer crickets in Scenario 2, or about the same number of crickets in both scenarios? Why do you think this?

5. Draw a column graph to show your prediction about the number of crickets that you expect to see in Scenario 1 (with kestrel) and Scenario 2 (no kestrel). You do *not* need to show the exact numbers of crickets in this graph – so in this case, you do not need to provide numbers on the y-axis.

6. Let's see if your prediction is consistent with our model.
We'll assume that each anole eats 5 crickets each year (this is not certainly enough food for an anole for a year, but remember that anoles eat MANY kinds of insects and spiders).

Scenario 1: Healthy forest, with a kestrel.
How many anoles remained in the forest at the end of the year? (Look at your answer on page 1 of this handout). _____

How many crickets do we start with? _____

Each anole eats 5 crickets. How many crickets are eaten? _____

How many crickets remain at the end of the year? _____

Scenario 2: No kestrel.
How many anoles remained in the forest at the end of the year? (Look at your answer on page 2 of this handout). _____

How many crickets do we start with? _____

How many crickets are eaten? _____

How many crickets remain at the end of the year? _____

Were you surprised by these numbers?

7. Now, draw a graph showing the number of crickets in Scenario 1 and the number of crickets in Scenario 2. This time, you have the exact number of crickets expected in each scenario, so you should provide numbers on the y-axis in this graph.

8. How do these results (the graph on this page) compare to your predictions (the graph you drew on page 3)? If they are different, why?

9. Think about the food web shown on page 1. In this food web, kestrels don't eat crickets! Kestrels eat snakes that eat lizards, and the lizards eat crickets. It's pretty amazing that removing ONE bird from our forest has such a large impact on all the other species in the forest. W**rite a scientific explanation for why removing the kestrel from the food web changes the numbers of copperheads, anoles, AND crickets.**

BONUS: If you worked for Texas Parks & Wildlife, and you only had enough money to protect one species in this forest, what species would you protect, and why?