# CREATING AN EASTERN DECIDUOUS FOREST FOOD WEB

# EDUCATION | BUILDING A VIBRANT CLUB

# **BACKGROUND INFORMATION**

The Wildlife Habitat Education Program (WHEP) is a hands-on environmental education program. WHEP allows participants to test their wildlife knowledge in a friendly competition as each state supporting WHEP conducts an annual contest where teams of 3-4 similarly aged individuals gather. This activity can be done to help learn about the species in the WHEP manual and prepare for a WHEP competition. This activity can also be a stand-alone activity to learn about food web concepts.

In every ecosystem, all living beings are connected. All species, from the smallest bacteria to the largest mammal, rely on one another. In each habitat, all species occupy their own specific niche or position within the system. The niche each species occupies is determined, in part, by the food they eat. A food web shows the BIRD connections between species based on the food(s) they eat. Like humans, most species will not eat the same food for every meal, meaning species may have multiple things they eat or multiple species that eat them.



In this activity, youth will demonstrate their knowledge and understanding of food webs in an eastern deciduous forest ecosystem by creating their own webs and reflecting on what they came up with.

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#### **EDUCATION**

The elements of a vibrant club meeting are designed to meet youth needs of belonging, independence, mastery and generosity.

- Welcome (10-20 min)
- Education (20-30 min)
- Recreation (20-30 min)
- Business Meeting (10-20 min)

#### CONCEPT

Create a food web.

#### AUDIENCE

Intended for groups of ten or more youth in grades 4-12.

#### **PRIORITY AREA**

Agriculture & Natural Resources STEM

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Species Identification Answers 14



#### VIBRANT CLUBS BEST PRACTICES

Having a time limit for youth to identify species and create the food web can help youth stay focused and engaged. Assist youth with identification as they need it using the clues provided.

This activity can easily be done with individuals, small or large groups. Provide individuals with a sheet with the reflection questions and encourage them to reflect independently.

Keep youth at the center of the activity. Allow them to talk through the questions together to come to an answer and provide plenty of time for youth to discuss their answers and reflect on the activity. You could allow youth to take turns stating the species when reviewing the answers. Always encourage youth to share their thoughts and ideas.

Share other opportunities for learning about wildlife, such as those listed in the Iowa 4-H Wildlife Project Area. Share information about local and regional wildlife conservation efforts, and any possible opportunities for youth to become involved.

Check with your County Extension Office to see if there is an active Wildlife Habitat Education Program (WHEP) to join, or consider starting one. Ask your County Extension Office if there are any Wildlife Project Area Workshops coming up, or if they know of other ways to become more involved in learning about wildlife or conservation. Check with your County Conservation Board, your County Extension Office, and the lowa DNR to see if there are other ways to learn and get involved with wildlife conservation.

The facilitator should print and cut out the "Species Identification Cards" before the meeting. In addition, the facilitator should cut the string or pipe cleaner to their desired length before the meeting. The facilitator should print out the "Species Identification Youth Answer Sheet," so there is enough for one per group if working in groups or one per person if working individually.

The facilitator may print the identification clue and answer sheets before the meeting. These clue and answer sheets are intended to be used only by the facilitator. Enough copies of the "Species Identification Cards" and pieces of string or pipe cleaners should be prepared so each group has one copy of the cards and enough string to make multiple connections.

Using the cards provided, participants should gather in small groups and identify the wildlife species on each card. If participants are having trouble identifying the species, the facilitator may read, or allow one youth from the group to read, aloud a clue that can assist in identifying the species.

Once the species have all been identified, the group should work together to create a food web that shows the connection between the species based on their food source. Use the string or pipe cleaner to show the connection between species by placing it between the desired species.

After completing all the webs, the facilitator should introduce the concept of trophic levels. A trophic level is an organism's position in the food web. Trophic levels include producers, or species that create their food using processes like photosynthesis; primary consumers, which are mostly herbivores; and secondary and tertiary consumers, such as omnivores and carnivores. Apex predators sit at the top of the system with no predators. Groups will reexamine their webs and identify each trophic level within their webs.

# REFLECT

Review the species and discuss each web after all teams have created their food web. The facilitator may allow groups to look at what the other groups came up with or invite the groups to explain their webs. Did all groups have the same web? Why might one group's web be different than another? Why was the sun included in the web? What would happen if one of the species in your web disappeared? For example, what if one species in the food web went extinct?

For older youth, discuss the transfer of energy among trophic levels. What trophic level has the most energy? What about the least? What happens when a living being dies? What happens to the energy it had?

# APPLY

Have you seen examples of food webs in the real world? What do you think biologists could do with this knowledge of food webs? What do you think biologists could do if one of the species in an ecosystem disappeared, or was disappearing? Is there anything you could do to help biologists?

Do humans fit into this web? Where? For older youth, what might happen if a large portion of the habitat is altered or lost? In what way do humans impact different food webs? In what ways do we as individuals impact different food webs?

#### MATERIALS

- Species Identification Cards
- Species Identification Clues
- Species Identification Youth Answer Sheet
- Species Identification Answer Sheet
- String or pipe cleaner
- Writing utensils

#### SPACE NOTES

This activity can be done indoors or outdoors.

#### **STANDARDS**

5-PS3-1: Use models to describe that energy in animals' food (used for body repair, growth, and motion and to maintain body warmth) was once energy from the sun.

MS-LS1-6: Construct a scientific explanation based on evidence for the role of photosynthesis in the cycling of matter and flow of energy into and out of organisms.

MS-LS2-1: Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem.

MS-LS2-2: Construct an explanation that predicts patterns of interactions among organisms across multiple ecosystems.

MS-LS2-3: Develop a model to describe the cycling of matter and flow of energy among living and nonliving parts of an ecosystem.

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For more information on the elements of a vibrant club, please see publication 4H 4004, Building a Vibrant Club at <u>https://</u> store.extension.iastate.edu/ product/12893. This activity can be done with youth via Zoom. Share your screen to show the species cards and allow youth time to identify each species. You can then allow the youth time to draw a food web using a piece of paper and pencil and hold it up to the camera to share, or you can use the "Annotate" function to allow the youth to draw the web on Zoom. If you use the "Annotate" function, it is recommended that you have a blank Word document or PowerPoint slide ready and share your screen so there is white space to make it easier to see.

# REFERENCES

- Iowa State University Extension and Outreach. (n.d.a.). Maples in Iowa. Natural Resource Stewardship. <u>https://naturalresources.extension.iastate.</u> edu/forestry/iowa\_trees/trees/maples.html
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- Iowa State University Extension and Outreach. (n.d.c). Wildlife. 4-H Youth Development. <u>https://www.extension.iastate.edu/4h/wildlife</u>
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# VIRTUAL ADAPTIONS

# **FACILITATOR INSTRUCTIONS**

# 1. Materials

- Items to print:
  - Species Identification Cards (1 set per group)
  - Species Identification Clues (1 total)
  - Species Identification Youth Answer Sheet (1 per group or 1 per person)
  - Species Identification Answer Sheet (1 total)
- String or pipe cleaner (or some other material that can be used to show connections)
  - Cut enough so each group can make multiple connections.
- Writing utensils
- 2. Pass out the species identification cards, string, youth answer sheet, and writing utensils to each group.
- 3. Instruct each group to identify each wildlife species on the cards for the first few minutes.
  - If groups are struggling to identify the species, the facilitator may assist by providing a clue from the Species Identification Clues sheet. There are three clues per species. The facilitator may choose which clue to present and may provide subsequent clues if the groups still need assistance.
  - Youth should focus on identifying wildlife species first but are welcome to try identifying the plant species if time allows.
  - Youth should write their answers on the youth answer sheet.
- 4. Once the groups appear to be finishing their identification, introduce the next step of creating a food web.
  - A food web is different than a food chain. A food chain outlines who eats whom, whereas a food web shows how species are interconnected by showing multiple chains in an ecosystem. Food webs are more realistic than food chains.
  - Youth should arrange their cards to demonstrate their understanding of a food web. They should use the pieces of string to show connections between species and be able to explain why those two species are connected.
- 5. After the groups have completed their food webs, discuss their answers and reflect.
  - First, have the youth take turns sharing the identity of each species.
  - After the species identification, have groups talk about their food webs. Depending on the group, you may also have them get up and walk around to look at the others.
  - Reflection questions to discuss:
    - Did all groups have the same food web? Answer: Probably not.

- Why might one group's food web be different than another? *Answer: Many species will eat multiple things depending on what is available.*
- Why was the sun included in the food web? Answer: Most organisms rely on energy from the sun. Producers like plants or algae rely on the sun for photosynthesis. Consumers then rely on these organisms for their food. Only certain bacteria do not rely on the sun for their food.
- What would happen if one of the species in your web disappeared? For example, what would happen if they went extinct? Answer: When one link or species is threatened or missing, it creates a domino effect, all of the other links are weakened or stressed. The amount of energy in the system declines. A loss of producers can lead to fewer consumers which can cause larger environmental impacts. A loss of organisms on a higher trophic level can also impact the environment by allowing lower level organisms to grow and devastate resources.
- For older youth, you may consider discussing trophic levels and energy transfer.
  - A trophic level is an organism's position in the food web. Trophic levels include producers, or species that create their own food using processes like photosynthesis; primary consumers, which are mostly herbivores; and secondary and tertiary consumers, such as omnivores and carnivores. Apex predators sit at the top of the system with no predators.
  - What trophic level has the most energy? Hint to be given by the facilitator if needed: Energy must be transferred through the ecosystem, it is not created. The primary source of energy for every ecosystem is the same: the sun. Answer: Producers.
  - What trophic level has the least energy? *Hint* to be given by the facilitator if needed: About 90% of energy is lost at each trophic level (only about 10% is transferred to the next level). Answer: The highest trophic level, such as tertiary consumers, has the least energy.
  - What happens when a living organism dies? What happens to the energy it had? *Hint to be given by the facilitator if needed: Dead organisms are still part of the food web. Answer: Decomposers like fungi and bacteria complete the food web. They turn organic waste, like decaying plants or animals, into inorganic material like nutrient-rich soil.*

### EASTERN DECIDUOUS FOREST SPECIES IDENTIFICATION CARDS

### **#1: EASTERN DECIDUOUS FOREST**



#### **#2: EASTERN DECIDUOUS FOREST**



# **#3: EASTERN DECIDUOUS FOREST**



# **#4: EASTERN DECIDUOUS FOREST**



# **#5: EASTERN DECIDUOUS FOREST**



# **#7: EASTERN DECIDUOUS FOREST**



# **#6: EASTERN DECIDUOUS FOREST**



# **#8: EASTERN DECIDUOUS FOREST**



# **#9: EASTERN DECIDUOUS FOREST**

#### **#10: EASTERN DECIDUOUS FOREST**



# **#11: EASTERN DECIDUOUS FOREST**



# **#12: EASTERN DECIDUOUS FOREST**



#### **#13: EASTERN DECIDUOUS FOREST**



# **#15: EASTERN DECIDUOUS FOREST**

#### **#14: EASTERN DECIDUOUS FOREST**



# **#16: EASTERN DECIDUOUS FOREST**





# **#17: EASTERN DECIDUOUS FOREST**



# **#19: EASTERN DECIDUOUS FOREST**



# **#18: EASTERN DECIDUOUS FOREST**



# **#20: EASTERN DECIDUOUS FOREST**



# **#21: EASTERN DECIDUOUS FOREST**



# **#23: EASTERN DECIDUOUS FOREST**



# **#22: EASTERN DECIDUOUS FOREST**



**#24: EASTERN DECIDUOUS FOREST** 



# EASTERN DECIDUOUS FOREST SPECIES IDENTIFICATION YOUTH ANSWER SHEET

ID #	ANSWER
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# EASTERN DECIDUOUS FOREST SPECIES IDENTIFICATION CLUES

ID #	SPECIES	CLUE		
1	white-tailed deer	<ol> <li>Most important game animal in North America.</li> <li>More than 30 subspecies throughout the U.S. and Canada.</li> <li>Extremely adaptable.</li> </ol>		
2	bluegill	<ol> <li>One of the most abundant Sunfish species.</li> <li>Thrives in a variety of conditions.</li> <li>Native to the eastern U.S. but successfully introduced throughout the country.</li> </ol>		
3	eastern cottontail	<ol> <li>Prefer brushy cover with interspersed herbaceous openings.</li> <li>May have seven litters per year with 3-6 young per litter.</li> <li>70-80% of individuals die each year.</li> </ol>		
4	northern bobwhite	<ol> <li>Stocky gamebird.</li> <li>Shrubland obligates.</li> <li>Males and females may incubate nests that typically contain a clutch of 12 eggs.</li> </ol>		
5	largemouth bass	<ol> <li>Technically members of the Sunfish family.</li> <li>Most popular freshwater sportfish in the states where they are found.</li> <li>Native to the eastern U.S. but successfully introduced throughout the country.</li> </ol>		
6	mourning dove	<ol> <li>Found throughout much of the lower 48 states.</li> <li>Prefer areas of annual and perennial grasses and forbs with some nearby trees and shrubs.</li> <li>Grit helps with digesting food.</li> </ol>		
7	wild turkey	<ol> <li>Large gamebirds.</li> <li>Adapted to use a variety of vegetation types.</li> <li>Poults (young) are precocial.</li> </ol>		
8	American woodcock	<ol> <li>Ground-dwelling, migratory shorebird.</li> <li>Nests are found in slight depressions among dead leaves on the forest floor.</li> <li>Gamebird population has declined due to land-use changes resulting in forest maturation, fire suppression, and increased human development.</li> </ol>		
9	bobcat	<ol> <li>Seldom active during the day.</li> <li>Carnivorous predators.</li> <li>Not considered a major source of mortality for deer.</li> </ol>		
10	brown thrasher	<ol> <li>Found in shrub and bramble thickets, hedgerows, shelterbelts, young forests, forest edges, and brushy riparian areas.</li> <li>Forage primarily on the ground, using beaks to turn over leaves and debris to look for food.</li> <li>Nests are usually found in bushes or small trees 1-10 feet off the ground.</li> </ol>		
11	eastern meadow lark	<ol> <li>Medium-sized songbird.</li> <li>Nest on the ground, females build nests from dead grass leaves.</li> <li>Nests contain 2-7 eggs; they may have three broods per year.</li> </ol>		
12	gray fox	<ol> <li>They generally avoid areas with large expanses of agriculture.</li> <li>Most active at night or near dawn and dusk.</li> <li>Unique among canids because of their ability to climb trees.</li> </ol>		
13	golden-winged warbler	<ol> <li>Ground-nesting songbird.</li> <li>Populations have declined since the 1960s because of habitat loss from forest maturation and competition fro other species.</li> <li>Require herbaceous groundcover with scattered shrubs and young trees.</li> </ol>		
14	eastern box turtle	<ol> <li>Named for its high, domed-shaped shell that closes tightly into a "box."</li> <li>Active throughout the spring, summer, and fall.</li> <li>Burrows into leaf litter and loose soil to overwinter.</li> </ol>		

# EASTERN DECIDUOUS FOREST SPECIES IDENTIFICATION CLUES (cont.)

ID #	SPECIES	CLUE	
15	wood duck	<ol> <li>Nest in tree cavities, usually within or adjacent to flooded timber.</li> <li>Cavity availability is critical for a sustainable population.</li> <li>Artificial cavities (nest boxes) are readily used and have been a big reason for the increase in population.</li> </ol>	
16	Indiana bat	<ol> <li>Endangered species; the population is declining because of susceptibility to disturbance during hibernation and white nose syndrome.</li> <li>Males roost alone or in small groups, while females roost in larger maternal colonies.</li> <li>Females give birth to one pup, and young are nursed under loose tree bark.</li> </ol>	
17	timber rattlesnake	<ol> <li>Long-lived reptiles, able to reach 25 years of age.</li> <li>Pit vipers contain a heat-sensing organ behind the nostrils to detect temperature differences.</li> <li>Spend approximately six months hibernating underground and will re-use a den for many years.</li> </ol>	
18	great horned owl	<ol> <li>Mostly nocturnal, roosting during the day in trees or on sheltered rocky ledges.</li> <li>Has a deep-toned, familiar call of 4 to 5 hoots.</li> <li>Monogamous breeders that lay 1-4 eggs in a nest in cavities of large trees.</li> </ol>	
19	eastern gray squirrel	<ol> <li>Forage along the edge of crop fields, trees, and on the ground.</li> <li>Den in cavities of mature trees and build nests generally 30 feet or more aboveground.</li> <li>Adapted to parks and other urban areas.</li> </ol>	
20	ovenbird	<ol> <li>Ground-dwelling warbler.</li> <li>Construct a dome nest of dead leaves, grasses, bark, and hair with an oval side entrance, all in the shape of an outdoor bread oven.</li> <li>Their clutch contains 3-6 eggs, and after hatching, the female takes half the brood and leaves the male with the other half.</li> </ol>	
21	maple*	<ol> <li>Typically have a large, rounded crown.</li> <li>Often used as a shade or ornamental tree but can also produce syrup and sugar.</li> <li>Leaves have three to five lobes.</li> </ol>	
22	oak*	<ol> <li>Official state tree of lowa.</li> <li>Twelve species are native to lowa and separated into red or white categories.</li> <li>At least one species is found in most woodland areas and communities.</li> </ol>	
23	witch-hazel*	<ol> <li>Found on moist, north-facing wooded slopes.</li> <li>Shrubs that typically have the first or last blooms of the season.</li> <li>Flowers consist of four strap-like petals that curl up on cold days and unfurl in warm weather.</li> </ol>	
24	sun		

\*Youth are not expected to know these but are welcome to try identifying the species if they want and time allows.

# EASTERN DECIDUOUS FOREST SPECIES IDENTIFICATION ANSWERS

ID #	SPECIES	FOOD SOURCE	TROPHIC LEVEL
1	white-tailed deer	Forbs, browse, acorns, beechnuts, soft mast, grains, grasses, mushrooms, coniferous browse	Primary consumer
2	bluegill	Zooplankton, insects, eggs, earthworms, tadpoles, small minnows, crayfish	Primary consumer+
3	eastern cottontail	Forbs and grasses, browse, soft mast, bark of shrubs and trees	Primary consumer
4	northern bobwhite	Insects, invertebrates, seeds, green vegetation, crops, mast	Primary consumer+
5	largemouth bass	Insects and other invertebrates, small fish, tadpoles, crayfish, ducklings	Primary consumer+
6	mourning dove	Grass and forb seeds, grains	Primary consumer
7	wild turkey	Hard mast, soft mast, insects and invertebrates, seeds, leaves from forbs and grasses, grain	Primary consumer+
8	American woodcock	Invertebrates	Secondary consumer
9	bobcat	Rabbits, rodents, opossums, raccoons, skunks, prong- horns, deer, snakes, birds, domestic poultry, livestock	Secondary consumer+
10	brown thrasher	Invertebrates, plant seeds, soft and hard mast	Primary consumer+
11	eastern meadow lark	Insects, seeds, grains	Primary consumer+
12	gray fox	Small mammals, birds, insects, hard and soft mast, carrion	Primary consumer+
13	golden-winged warbler	Insects	Secondary consumer
14	eastern box turtle	Earthworms, snails, slugs, insects, mushrooms, leafy greens, fruits	Primary consumer+
15	wood duck	Acorns, hard mast, seeds and soft mast, waste grain, insects, invertebrates	Primary consumer+
16	Indiana bat	Insects	Secondary consumer
17	timber rattlesnake	Small to moderate-sized mammals, chipmunks, mice, voles, squirrels, small birds	Secondary consumer+
18	great horned owl	Varied diet including small- to medium-sized mammals, reptiles, amphibians, large insects, fish	Secondary consumer+
19	eastern gray squirrel	Hard and soft mast, seeds, grains, bark, buds, mushrooms, bird eggs	Primary consumer+
20	ovenbird	Insects	Secondary consumer
21	maple*	Photosynthesis	Producer
22	oak*	Photosynthesis	Producer
23	witch-hazel*	Photosynthesis	Producer
24	sun		Source of energy

+This is the lowest trophic level this species can be found, but it may be higher.

\*Youth are not expected to know these but are welcome to try identifying the species if they want and time allows.