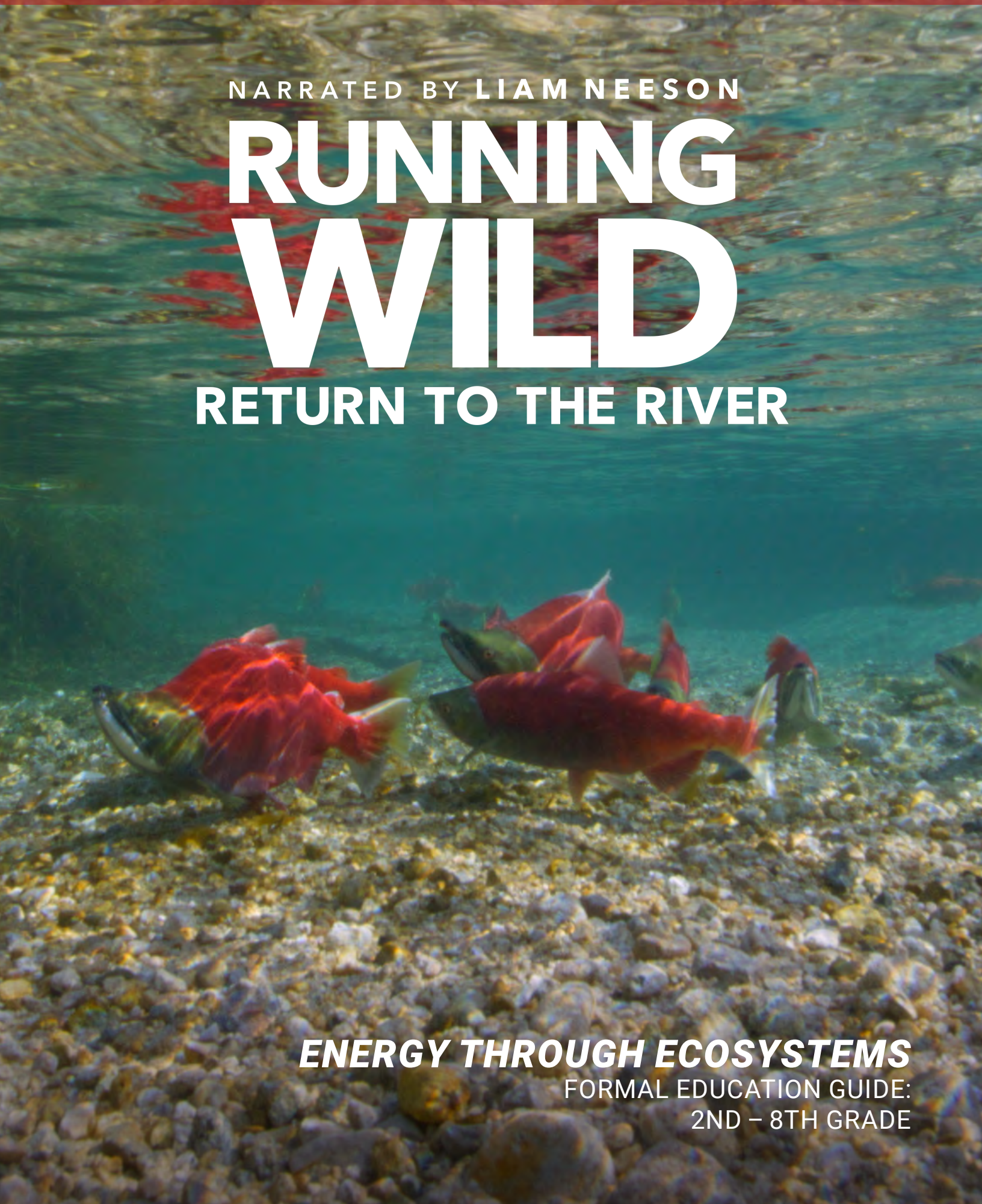
COMPANION LEARNING GUIDE



NARRATED BY **LIAM NEESON**

RUNNING WILD

RETURN TO THE RIVER

ENERGY THROUGH ECOSYSTEMS

FORMAL EDUCATION GUIDE:
2ND – 8TH GRADE

Key Concepts

- An ecosystem is a community of organisms and the places they live. All of the members of an ecosystem are interconnected and important.
- Food chains connect the members of an ecosystem. In a food chain, matter moves between plants, animals, decomposers, and the environment.

Setup

- Collect enough stick-on nametags to give one to each student and teacher.
- On each nametag, write one of the following food chain groups. Aim to have approximately the same number of nametags for each group (does not have to be exact):
  - Plant
  - Animal
  - Decomposer
  - Environment
- Print one "Plants, Animals, Decomposers, Environment" list.
- If possible, allot 5-15 minutes during which students can spend time outside in the grass to notice and enjoy nature.
- Print review worksheets, and set out colored pencils.

Next Generation Science Standards
5-LS2-1 Ecosystems: Interactions, Energy, and Dynamics
Develop a model to describe the movement of matter among plants, animals, decomposers, and the environment.

Vocabulary

Decomposer – an organism that breaks down dead plants and animals and recycles the nutrients back into the environment.

Ecosystem – a community of organisms and the places they live.

Food Chain – the relationship between organisms that depend on each other for food.

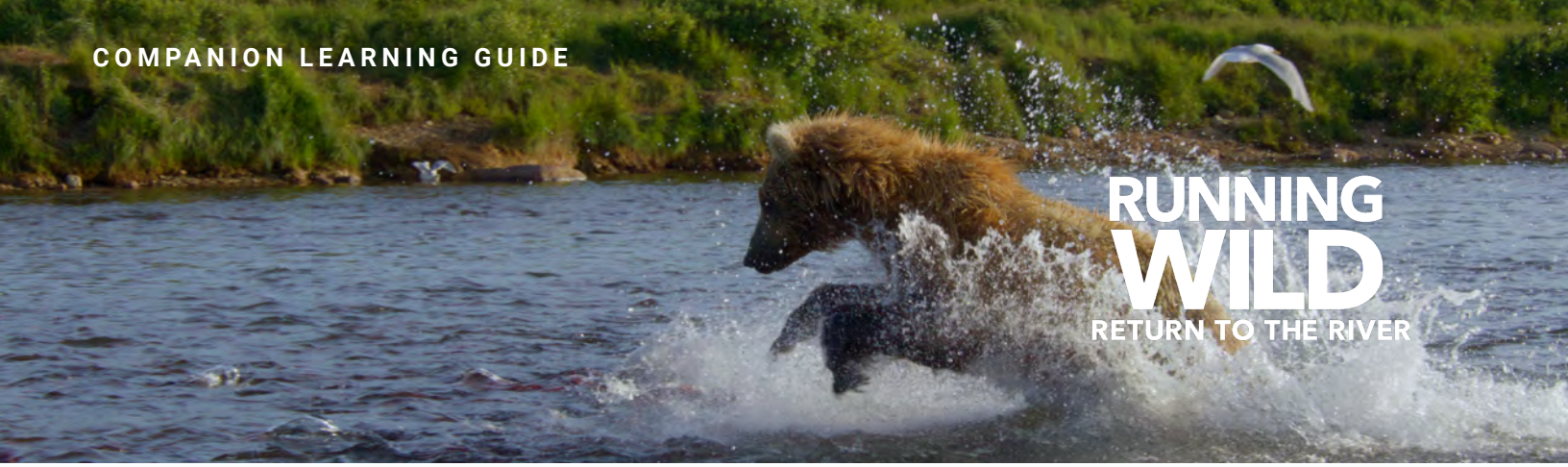
Food Web – the full collection of food chains in an ecosystem.

Matter – a physical substance made of tightly-packed energy, which takes up space and has weight.

Organism – any living thing (from a tiny amoeba to a huge blue whale!).

Materials

- Stick-on nametags
- Pen or sharpie
- Ball of yarn or string (at least 20 yards)
- Printed Plants, Animals, Decomposers, Environment list
- Printed review worksheets



Procedure

Introduction: Energy Through Ecosystems

I am going to begin by asking you a few questions. Remember, you need to raise your hand if you think you know the answer!

- Have you ever heard the word "organism" before? What is an organism?
  - **Answer:** An organism is any living thing (from a tiny amoeba to a huge blue whale)!
  - Can you name one organism that lives in your home? Raise your hand to share!
    - **Instructor Note:** Prompt students to name people, pets, and even houseplants!
- Great answers! Now, have you ever heard the word "ecosystem" before? What is an ecosystem?
  - **Answer:** An ecosystem is a community of organisms and the places they live. This means that an ecosystem has two parts - the plants, animals, and fungi that live in a place, and the place itself.
- One example of an ecosystem is a coral reef. What kinds of animals might be found living in a coral reef ecosystem? Raise your hand to share!
  - **Answer:** Shark, octopus, fish, eel, crab, stingray, and more!
  - What about the physical features - the non-living environment of a coral reef? What kinds of non-living things could we find in a coral reef ecosystem?
    - **Answer:** Rocks, sand, saltwater, and more!
    - Fun Fact: Coral is alive, and is actually a type of animal!
  - Another example of an ecosystem is an estuary. An estuary is a place where a river meets the sea, and fresh water and sea water mix together. In an estuary, you might find organisms like algae, pickleweed, otters, crabs, oysters, birds, and salmon.

It is important to know that all of the members of an ecosystem are connected and important. How are they connected? What do you think? Raise your hand to share!

- **Answer:** The members of an ecosystem are connected through food chains. A food chain is the relationship between organisms that depend on each other for food.
  - Can you give one example of a food chain, using a few plants and animals? Raise your hand to share!
  - **Instructor Note:** Project an image of a food chain diagram to visually demonstrate this concept. There are many great examples online!

As plants and animals become part of the food chain, there is something always moving along with them. It is the thing that connects them, what really happens when one organism eats another - the movement and sharing of matter.

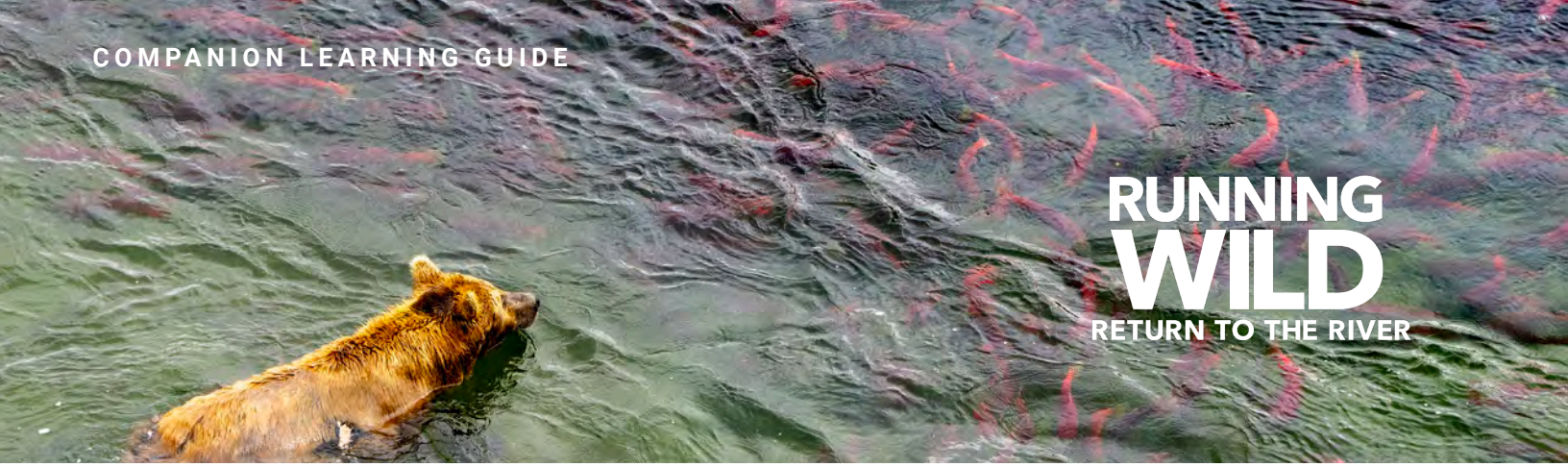
- Matter is a physical substance made of tightly-packed energy, which takes up space and has weight. All living things, every organism, needs matter to exist - at a super tiny, microscopic level, it is what our bodies are all made of!

Wait, how does matter connect all of the organisms in an ecosystem? How is matter secretly moving all throughout the food chain? The short answer is through eating, pooping, and dying! Wait, what?

- To understand this better, let's start by thinking about plants. What do plants need in order to grow?
  - **Answer:** Sunlight, water and air.
- Plants create their own food using sunlight, water, and air. These things help them to create energy!
- Remember, matter is a substance made of tightly-pack energy. So, when an animal comes along and eats that plant, the matter from the plant moves into the animal.
- Now, when that animal dies, chances are that its body will be eaten up and broken down by decomposers. A decomposer is an organism that breaks down dead plants and animals and recycles (or poops!) the nutrients back into the environment. A few examples of decomposers are earthworms, beetles, millipedes, and mushrooms. So, when the decomposer breaks down the dead animal's body and recycles the nutrients back into the environment, the matter from the animal moves into the soil, water, and air.
- These nutrients in the environment will help to nourish the growing plants, and the cycle of matter moving through the food chain begins all over again!

6th-8th Grade Only:

- In a food chain, "decomposer" is the special scientific name for the organisms that break down dead materials and recycle out the nutrients.
- There are two additional scientific names used to describe the groups in a food chain.
  - "Producers" are organisms that create their own food and energy using sunlight, water, and air. A few examples of producers include plants and algae.
  - "Consumers" are organisms that do not create their own food and energy, and must get these things by eating other organisms. A few examples of consumers include salmon, squirrels, bunnies, deer, bears, and humans.



ACTIVITY

Totally Tangled! Becoming a Food Web

It's time for an activity! Let's play a quick game that will help us to learn more about the movement of matter in a food chain. But first, let's review what we've learned so far.

- What is an organism?
  - **Answer:** An organism is any living thing (from a tiny amoeba to a huge blue whale!).
- What is an ecosystem?
  - **Answer:** An ecosystem is a community of organisms and the places they live.
- What is matter?
  - **Answer:** Matter is a physical substance made of tightly-packed energy, which takes up space and has weight.
- What is a food chain?
  - **Answer:** A food chain is the relationship between organisms that depend on each other for food.
- What is a decomposer?
  - **Answer:** A decomposer is an organism that breaks down dead plants and animals and recycles out the nutrients.

We are now going to become members of our very own food web. You will either be an organism (a living thing) or a part of the environment (soil, air, or water). We will be using a ball of yarn to represent matter, and as the matter moves throughout our ecosystem, we will be tracking all of the different places that it has been.

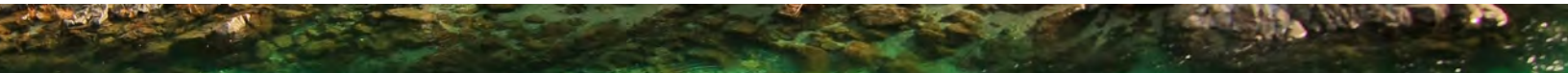
Some important rules for this activity are:

- **Rule #1:** When you hear your group name, put your hands up by your chest and be ready to catch! If it is another group's turn, keep your hands down. Putting your hands up or down will help others to know what group you are in.
- **Rule #2:** Once you have caught the ball of yarn, you will soon be tossing it to another person. Hold tight onto your piece of string, and let the yarn unravel as you toss it to the next person.
- **Rule #3:** You must not throw the ball of yarn too hard. Please only use a gentle toss, and make safe choices for the people and things around you.
  - **Instructor Note:** Quickly review the printed Plants, Animals, Decomposers, Environment list. Use these species, or some of your own, as you call out students in the game to follow.
    Next, put on one of the "plant" nametags. You must be a plant, as you will be the very first one to kick off the food chain! Then, pass out the remaining nametags to students in a random order and ask them to put them on.

How to Play:

I am a plant. What a beautiful dandelion I am! I create my own food using sunlight, water, and air. I turn this food into energy, but then I am eaten by an animal! The matter is ready to move! Raise your hands if you are an animal!

- **Instructor Note:** Gently toss the ball of yarn to one of the "animal" students, making sure to hold on tight to the end of your yarn. Ask the student to hold the ball of yarn quietly until you give them permission to toss.



- This student is an animal. Look at what a great rabbit they are! Once this rabbit dies, it is eaten by a decomposer. The matter is ready to move! Raise your hands if you are a decomposer! Now, toss!
- This student is a decomposer. Look at what a cool mushroom they are! Once this mushroom breaks down the dead rabbit, they release the nutrients back into the environment. The matter is ready to move! Raise your hands if you are part of the environment! Now, toss!
- This student is part of the environment. Look at what awesome soil they are! It receives recycled nutrients from the decomposer, and uses those nutrients to help nourish the growing plants. The matter is ready to move! Raise your hands if you are a plant! Now, toss!
  - **Instructor Note:** Repeat the steps above until every student is holding a piece of string. The class should resemble one large, tangled, interconnected web!
- Look at the way that our food chains have all become connected! In fact, our food chains now look a little bit like a spiderweb.

2nd-5th Grade Only:

- **Instructor Note:** Time permitting, offer your class the chance to play one more round. Instruct them to switch nametags and join a new food chain group.

6th-8th Grade Only:

- **Instructor Note:** Time permitting, offer your class the chance to play one more round. Instruct them to switch nametags with someone nearby and join a new group of the food chain. Then, challenge them to facilitate the movement of matter on their own (ex. "I am a daisy, and I was eaten by an animal. Animals, hands up!").

Amazing work! There were so many food chains in our community. Did you notice how our food chains connected the entire ecosystem? Because there are always so many different food chains in one ecosystem. In fact, what we just demonstrated in our activity was more than a food chain, it was a food web!

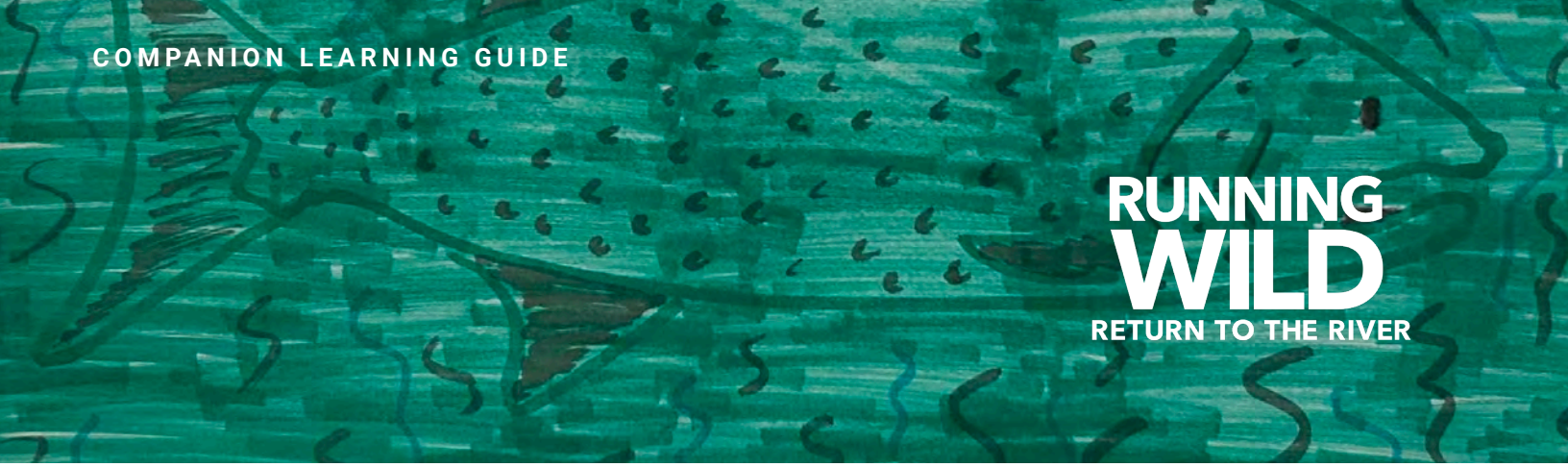
- A food web is the full collection of food chains in an ecosystem.
- **Instructor Note:** Project an image of a food web diagram to demonstrate this concept. There are many great examples online!

In an ecosystem, the community of organisms and the places they live are all deeply connected. One of the ways that they are connected is through food chains. In a food chain, matter is moved from one part of the ecosystem to another through either eating, pooping, or dying. Every member of an ecosystem is important, because the entire community is connected.

Fun Fact: As matter moves through each level of the food chain, some of that energy is lost. Because of this, eating plants (like fruits and veggies!) is much more energy-efficient than eating meat.

"Run Wild" Time

Move the class to an outdoor area for just 5-15 minutes, ideally away from the school playground. Invite them to notice and feel curious about nature a little extra after their time watching "Running Wild." Encourage them to touch the dirt, grass, twigs, and leaves; feel the warm/cool air on their skin; listen for birds, bugs, and the wind; smell the plants around them; and try to spot insects.



Review Questions

What is an ecosystem?

_____

What is a food chain?

_____

How do food chains connect the members of an ecosystem?

_____

What is one example of a plant? An animal? A decomposer? Part of the environment?

_____

Why are all of the members of an ecosystem important?

_____

What is one thing you saw in the Running Wild: Return to the River film that surprised or amazed you?

_____

Name:

Date:

RUNNING WILD:
ENERGY THROUGH ECOSYSTEMS

What is a food chain? How do food chains connect the members of an ecosystem?

My sketches of…

a plant

an animal

a decomposer

the environment

RUNNING WILD:
PLANTS, ANIMALS, DECOMPOSERS, & ENVIRONMENT LIST

- **Plants:**
  - *Dandelion*
  - *Goldenrod*
  - *Blackberry Bush*
  - *Purple Needlegrass*
  - *Willow Tree*
  - *Clover*

- **Animals:**
  - Black Bear
  - *Deer*
  - *Beaver*
  - *Rabbit*
  - *Grasshopper*
  - *Caterpillar*

- **Decomposers:**
  - *Mushroom/Fungi*
  - *Bacteria/Protozoa*
  - *Earthworm*
  - *Termite*
  - *Millipede*

- **Environment:**
  - *Soil*
  - *Water*
  - *Air*

Shore Crab
Habitat: Coastal Estuary

Anchovy
Habitat: Coastal Estuary

Snowy Egret
Habitat: Coastal Estuary

River Otter
Habitat: Coastal Estuary

“Unity & Diversity: In It Together!” Cards

COASTAL ESTUARY

Instructor Note:
Please print double-sided

Leopard Shark
Habitat: Coastal Estuary

ANCHOVY

Eats plankton and newly hatched fish

Job: Food for Other Animals

Habitat Plants & Algae: Elgrass, sea lettuce, pickleweed, and more!

SHORE CRAB

Eats algae, worms, and more!

Job: Scavenger Cleanup Crew

Habitat Plants & Algae: Eelgrass, sea lettuce, pickleweed, and more!

RIVER OTTER

Eats crabs, fish, water bugs, and more!

Job: Pest Control Eating Small Animals

Habitat Plants & Algae: Elgrass, sea lettuce, pickleweed, and more!

SNOWY EGRET

Eats crabs, shrimp, fish, water bugs, and more!

Job: Pest Control Eating Small Animals

Habitat Plants & Algae: Elgrass, sea lettuce, pickleweed, and more!

LEOPARD SHARK

Eats crabs, fish, worms, and more!

Job: Pest Control Eating Small Animals

Habitat Plants & Algae: Elgrass, sea lettuce, pickleweed, and more!

“Unity & Diversity: In It Together!” Cards

COASTAL ESTUARY

Instructor Note:
Please print double-sided

Orca
Habitat: Ocean

Sea Lion
Habitat: Ocean/Coast

Sea Wolf
Habitat: Ocean/Coast

Harbor Seal
Habitat: Ocean/Coast

“Unity & Diversity: In It Together!” Cards

OCEAN

Instructor Note:
Please print double-sided

Northern Pike
Habitat: Ocean

SEA LION

Eats fish, squid, octopus, and more!

Job: Pest Control
Eating Small Animals

Habitat Plants & Algae:
Eelgrass, sea lettuce, bull kelp, and more!

ORCA

Eats seals, fish, squid, and more!

Job: Pest Control
Eating Small Animals

Habitat Plants & Algae:
Eelgrass, sea lettuce, bull kelp, and more!

HARBOR SEAL

Eats crabs, fish, squid, and more!

Job: Pest Control
Eating Small Animals

Habitat Plants & Algae:
Eelgrass, sea lettuce, bull kelp, and more!

SEA WOLF

Eats fish, clams, mussels, and more!

Job: Brings Ocean Nutrients to the Forest

Habitat Plants & Algae:
Eelgrass, sea lettuce, bull kelp, and more!

NORTHERN PIKE

Eats birds, frogs, mice, fish, and more!

Job: Pest Control
Eating Small Animals

Habitat Plants & Algae:
Eelgrass, sea lettuce, bull kelp, and more!

“Unity & Diversity: In It Together!” Cards

OCEAN

Instructor Note:
Please print double-sided

Bald Eagle
Habitat: River

Grizzly Bear
Habitat: River

Painted Turtle
Habitat: River

Red-Legged Frog
Habitat: River

“Unity & Diversity: In It Together!” Cards

RIVER

Instructor Note:
Please print double-sided

American Beaver
Habitat: River

GRIZZLY BEAR

Eats fish, roots, berries, insects, and more!

Job: Scatters Seeds & Eats Small Animals

Habitat Plants: Pines, willows, cattails, cottonwoods, and more!

BALD EAGLE

Eats rabbits, squirrels, fish, and more!

Job: Scavenger Cleanup Crew

Habitat Plants: Pines, willows, cattails, cottonwoods, and more!

RED-LEGGED FROG

Eats crabs, fish, worms, water bugs, and more!

Job: Food for Other Animals

Habitat Plants: Pines, willows, cattails, cottonwoods, and more!

PAINTED TURTLE

Eats fish, plants, water bugs, and more!

Job: Pest Control Eating Small Animals

Habitat Plants: Pines, willows, cattails, cottonwoods, and more!

AMERICAN BEAVER

Eats woody plants, grass, clovers, and more!

Job: Creates Wetlands with Dams & Ponds

Habitat Plants: Pines, willows, cattails, cottonwoods, and more!

“Unity & Diversity: In It Together!” Cards

RIVER

Instructor Note:
Please print double-sided

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