Dining Out With
Fishes and Birds of the Hudson

Students examine photographs of fish mouths and bird beaks to draw conclusions about these animals' eating habits and their roles in food webs.

Objectives: Students will examine photographs of living creatures to:
- observe external physical features necessary for taking in food;
- understand how these animals are adapted for survival in their environment.

Grade level: Elementary (Grades 3-6)

Subject Area: Science

Standards: Mathematics, Science, & Technology Standards 1, 4

Skills:
- Observe characteristics of creatures native to the Hudson.
- Predict each animal's role in the food web based on these observations.

Duration:
Preparation time: 5 minutes
Activity time: 30 minutes per worksheet

Materials: Each student should have:
- ☐ Worksheets: Dining Out With Fishes of the Hudson, Dining Out With Birds of the Hudson, Weaving Food Chains Into Food Webs
- ☐ Pencil or pen
- ☐ Scissors
- ☐ Blank sheet of paper
- ☐ Paste or tape

Note: A simpler food chain lesson - "What Do Animals Need to Stay Alive? FOOD!" - is available for kindergarten to third grade students at http://www.dec.ny.gov/education/77601.html.

Hudson River Estuary Program
NYS Department of Environmental Conservation

Background:
Fishes and birds are the most abundant and diverse of the vertebrate animals found in the Hudson River Valley. They display an amazing variety of adaptations for survival in habitats along the estuary. Adaptations for obtaining food are among the most obvious features of these animals; they offer insights into how each species relates to others through food webs.

Activity:
- Introduce the concept of adaptation by having students read the selection "Adapting to Estuaries" from the Hudson River Estuary Program's Readings in Natural History lessons.
- Go over each worksheet with the class or hand out as an in-class or homework assignment.
- Extension: have students research and write short reports about one of the fish or birds.

Assessment:
- Have students share answers to questions from worksheets, or collect and grade sheets.
- Have students construct their own food webs using pictures and information about common Hudson River organisms available at http://www.dec.ny.gov/education/88154.html.

Vocabulary:
adaptation: a feature that allows an organism to deal with environmental conditions
algae: single celled, sometimes colonial, plants without a vascular system – the tubes that move sap and water through plants
barbel: fleshy "whisker" on fish
crustacean: one of a class of mostly aquatic arthropods such as shrimp, crabs, and Daphia
decay: decompose; break down chemically into constituent compounds
energy: the ability to do work, to power activity; the sun (solar) and food are sources
food chain: the path by which energy in food moves from one organism to another
food web: interwoven food chains linking organisms to many food sources
habitat: the particular sort of place where a given plant or animal lives
invertebrate: an animal without a backbone
larva: an early form or life stage of an animal; plural is *larvae*
organism: an individual living thing (plant, animal, bacteria, etc.)
predator: an animal that lives by killing and eating other animals
prey: an animal taken as food by another animal
specialized: adapted for a particular function or lifestyle
zooplankton: animals, mostly tiny, that drift in water, unable to swim strongly

Resources:
The Department of Environmental Conservation posts pictures and information about freshwater fish in this lesson at http://www.dec.ny.gov/animals/269.html At this writing there is not a similar site for the saltwater fishes – lined seahorse, Atlantic needlefish, and northern pipefish. However, an internet search for each fish's name will find useful websites.

A broad array of information about birds is available on the Cornell Laboratory of Ornithology's website at http://www.birds.cornell.edu/ . Worth noting are the Educator's Guide to Bird Study at http://www.birds.cornell.edu/schoolyard/ and the Bird Guide at All About Birds http://www.birds.cornell.edu/AllAboutBirds/ . For links to DEC fact sheets and information pages about birds, visit http://www.dec.ny.gov/animals/271.html

Dining Out With Fishes of the Hudson: ANSWER KEY

Dining Out With Fishes of the Hudson

Many different kinds of fish live in the Hudson. They come in all shapes and sizes, and have a variety of **adaptations** for survival. A fish's mouth, for example, tells us a lot about its lifestyle. Some fish have **specialized** mouths and are picky eaters. Others eat almost any **prey** that fits in their mouths.

Look at each picture the next page. How big is the fish's mouth? Does it point straight ahead or down towards the bottom? How big is each fish? (The numbers give average lengths of adults), Then from the selection below, choose the preferred food(s) of each fish and write its letter(s) next to each fish.

lined seahorse *– 5"*

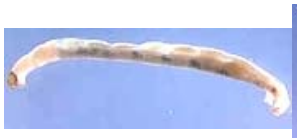
Examples: The lined seahorse's snout is a tube that ends in a tiny mouth. Using it like a medicine dropper, this small fish sucks in tiny **invertebrates** that drift or swim nearby—food items listed in Group **D**.

The pumpkinseed sunfish has a small, rather ordinary (for a fish) mouth. Not having a specialized mouth, it eats a variety of animals in Groups **B** and **C**.

pumpkinseed *– 6"*

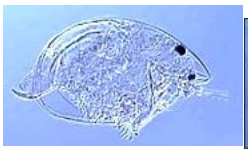
A. Frogs, fish, big crustaceans

B. Small creatures on river bottom:
insect larvae, crustaceans, worms



C. Tiny fish, crustaceans, insects

D. Tiny invertebrates, zooplankton



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Write the letter of each fish's preferred food group (or groups) on the line

1. walleye *– 20″*
Sharp teeth hold slippery prey in this big mouth.

___A___

2. shortnose sturgeon *– 36″*
Its mouth points down. **Barbels** (whiskers) allow it to find food by feel and taste where there is little or no light.

___B___

3. Atlantic needlefish *– 18″* These sharp teeth can hold slippery prey. ***_A, C; prefers fish_***

4. northern pipefish *– 10″*
It has a tiny mouth at the tip of a tube-like snout.

_____D_____

5. white sucker *– 14″*
Its mouth points down.

___B___

6. largemouth bass *– 15″* Its name says it all! __A___

7. white perch *– 9″*
Its mouth is small and not specialized.

___B, C___

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Dining Out With Birds of the Hudson: ANSWER KEY

Dining Out With Birds of the Hudson

Hundreds of different birds can be seen along the Hudson River. There are big ones, like eagles and swans, and tiny ones, like hummingbirds. All have special **adaptations** for the lifestyle that they lead and the **habitat** where they live. Beaks, for example, give clues to what birds eat and how they catch their food.

The great blue heron stands still, waiting for fish to swim by. When one comes close, the heron stabs it with a beak that is shaped like a spear point.

Tiny warblers search for insects in trees and shrubs. Their small beaks are thin and pointed like tweezers —perfect for picking up tiny bugs.

Look at the birds pictured on the next page. Choose which bird best fits each description below, and write its name in the space provided.

1. Swimming underwater, this bird grabs fish with a long hooked beak.

   double-crested cormorant

2. This bird has a long thin beak. It picks tiny creatures out of water and mud.

   solitary sandpiper

3. The beak of this bird looks like a spoon. Slots along the sides of the beak let water drain out of a mouthful of plants, crustaceans, worms, and insects.

   mallard duck

4. This bird's short, thin, pointed beak is adapted for picking up insects.

   yellow warbler

5. This swift predator catches other birds that it eats with its hooked beak.

   peregrine falcon

6. This small bird has a stout bill for cracking open seeds.

   indigo bunting

7. This bird spears fish with its strong, sharply pointed beak.

   great egret

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Decide which bird best fits each description on the last page.
Write its name in the space below that description.

Bird photos on these pages courtesy of Michael Pogue.

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Weaving Food Chains Into Food Webs : ANSWER KEY

Weaving Food Chains Into Food Webs

Each fish and bird is **adapted** for a certain diet. Great blue herons eat fish such as white perch. White perch eat, among other things, **crustaceans** like shrimp. The heron, perch, and shrimp are links in a **food chain**. In food chains, energy in food moves from one **organism** to another.

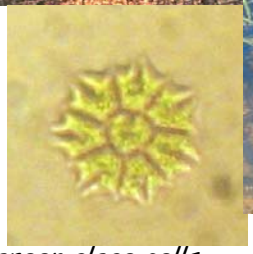
shrimp

white perch

great blue heron (photo by Brian Houser)

People are part of food chains. The tuna in the sandwich you might eat for lunch comes from a fish. Tuna eat smaller fish that might eat crustaceans. But what do crustaceans eat? What is the first step in the chain?

The **energy** that people and other animals need comes from the sun. This **solar energy** is changed into food energy by green plants visible all around us and by tiny **algae** visible through microscopes. This food energy also enters the food chain after plants die. Crustaceans feed on algae, plants, and **decaying** plant matter like dead leaves. Worms also eat decaying plant matter.



green algae cells

water celery – a green plant

dead leaves

Scud (a type of crustacean) feeding on dead leaves (photo by Eric Lind)

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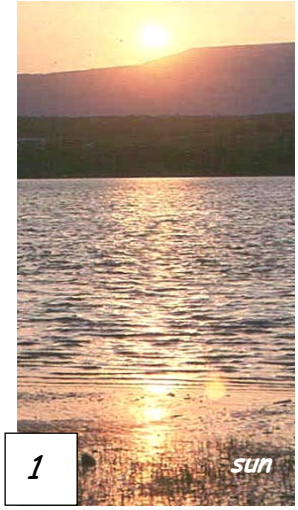
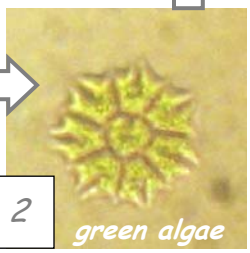
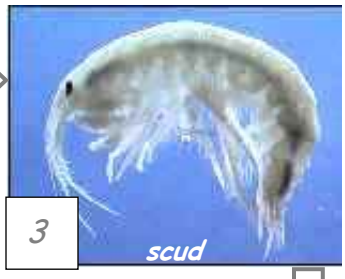
To make a complete Hudson River food chain, let's put the sun and plant steps together with diet information from the Dining Out With Fishes and Birds worksheets. Our example starts with the sun and ends with a **predator** not usually eaten by any other animal.







The five photographs below show steps in another food chain. Put them in order from 1 to 5, writing the numbers in the boxes provided. Then draw arrows showing how food energy travels from one piece of the food chain to the next. Your food chain should begin with the source of the energy and end with a predator not usually eaten by any other animal.

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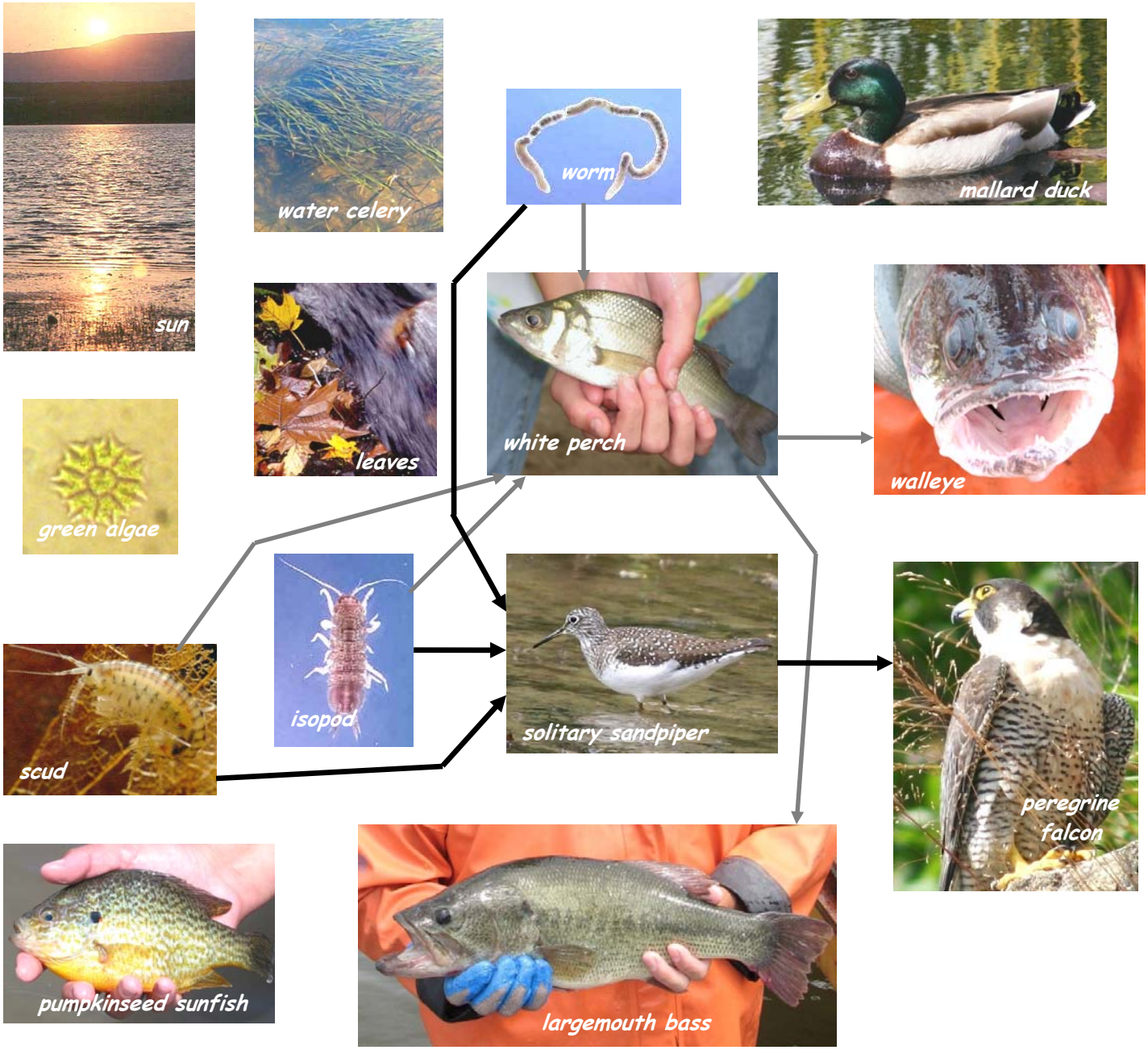
Most animals eat a variety of foods: different kinds of fish, for example, or a diet combining small crustaceans, insects, and worms. Think how bored—and unhealthy—you would be if all you ever ate were peanut butter sandwiches.

When each animal eats many different things, food chains become **food webs**. Look at all the arrows going to and from the white perch below. It eats worms, scuds, and isopods, and is in turn eaten by walleye and largemouth bass.

Following the example of the white perch, draw arrows linking the solitary sandpiper to the foods it eats and to any predator that might eat it.



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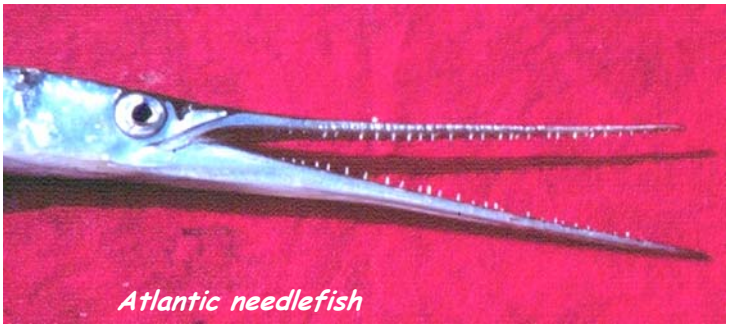
Use the pictures below and information from all the worksheets to create a Hudson River food chain. Cut out the pictures below. Arrange them in a food web on a blank sheet of paper. Paste them down. Then draw arrows linking each member of the food web below to all the other animals or plants that it eats, or that eat it. Link the plants to their source of energy too.

Except as noted, bird photos on these pages courtesy of Michael Pogue.



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