



## Salmon Life Cycle

*Students learn about the life cycle of Pacific salmon and how salmon depend on estuary habitats.*

Salmon depend on estuaries and nearshore habitats during their migration between fresh and salt water. While different species and populations use the estuary for different lengths of time, the following is a typical salmon life history.

**Eggs** are laid in freshwater gravel beds, often in streams.

**Alevin** are newly hatched salmon. They live in the gravel, using the food stored in their yolk sacs.

**Fry** are small salmon living in the freshwater stream, feeding on insects and other invertebrates.

**Smolt** have changed their shape and color, and have gone through physiological changes necessary for life in salt water. They often spend time in salt marshes and bays, taking advantage of abundant food (small invertebrates) and protection from predators.

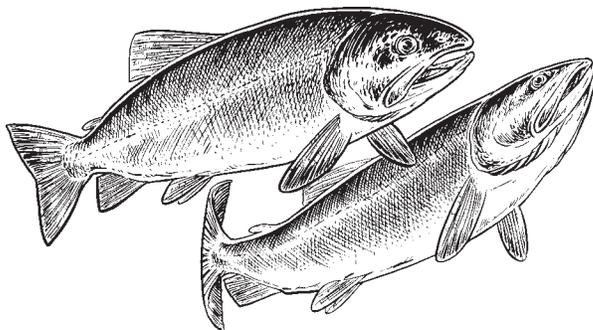
**Adults** live in deeper ocean water, feeding on fish such as herring, sand lance, and rockfish, as well as on zooplankton.

**Spawning adults** migrate back to their home stream to reproduce. Their bodies change shape and color, and they stop eating once they enter fresh water.

Share this information with your students, referring to the life cycle pictures on the next page.

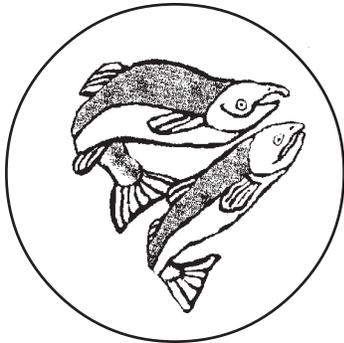
Have your students cut out the pictures on page 49 and arrange them in the correct order.

*\* There are many salmon resources available to teachers, including posters, videos, books, kits and curricula. Call the Padilla Bay Interpretive Center for more information. (360) 428-1558*

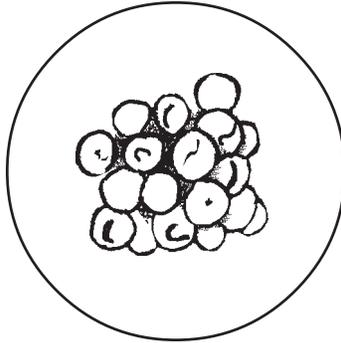




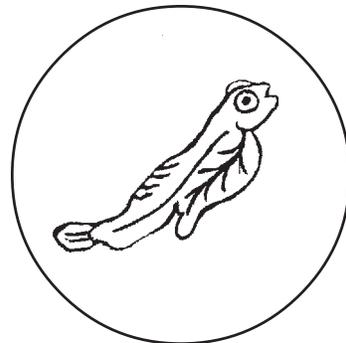
# Salmon Life Cycle



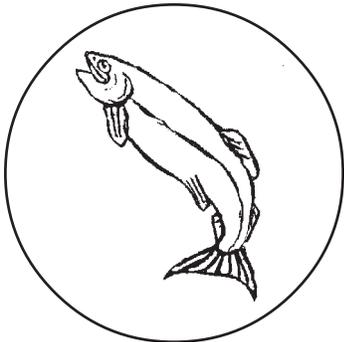
spawning adult



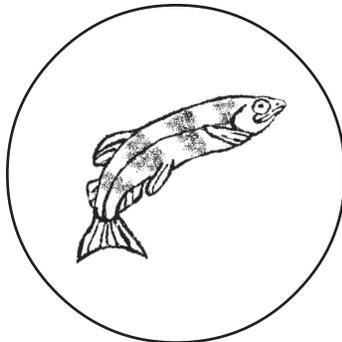
eggs



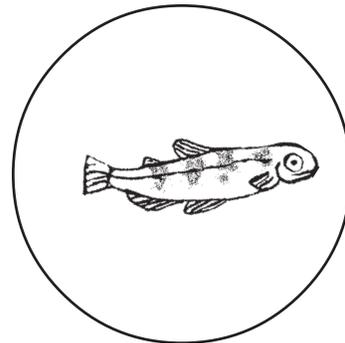
alevin



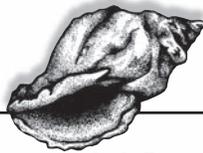
adult



smolt

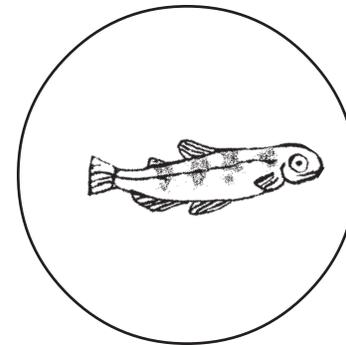
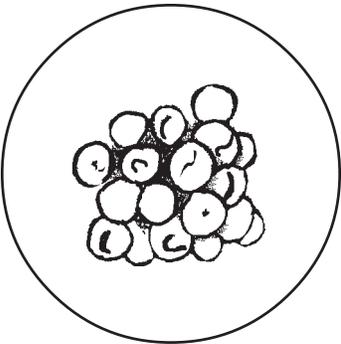
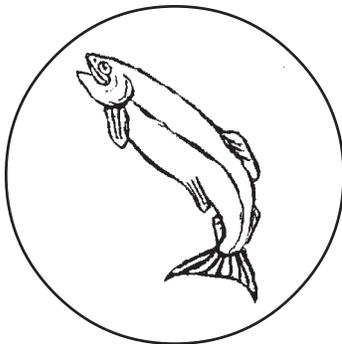
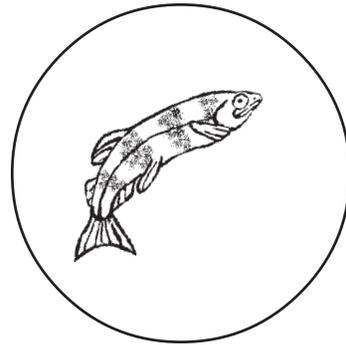
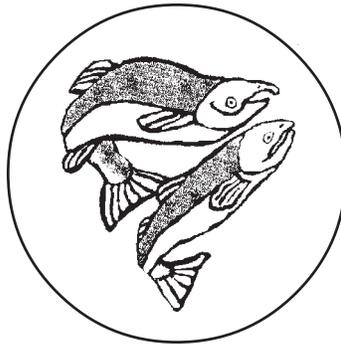
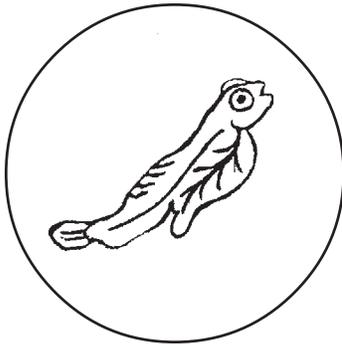


fry



# Salmon Life Cycle

Cut out the salmon and paste them in a circle showing the salmon life cycle. Label them with the words below.



eggs

alevin

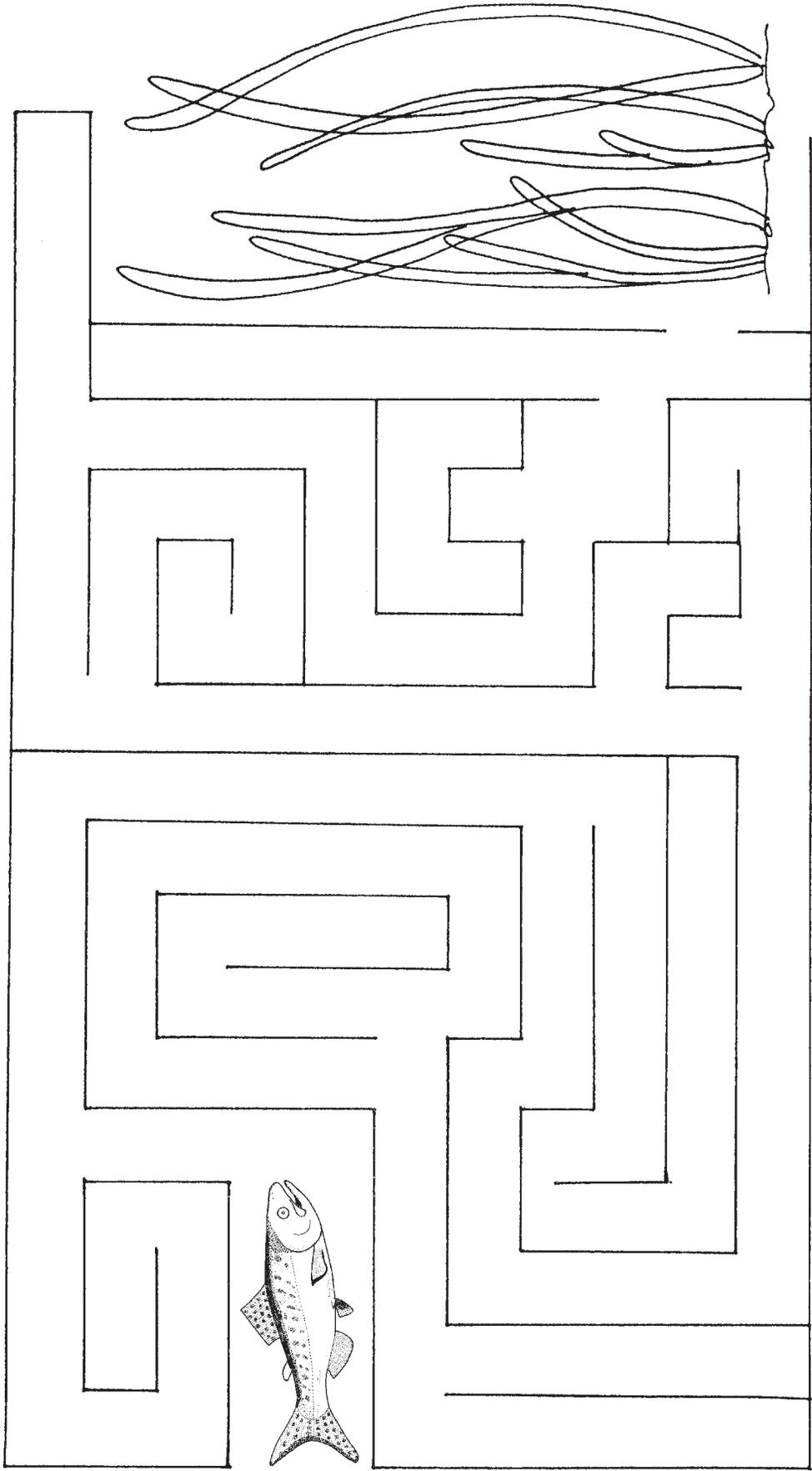
fry

smolt

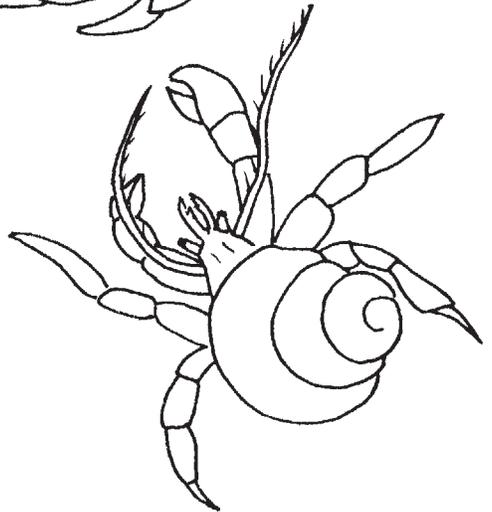
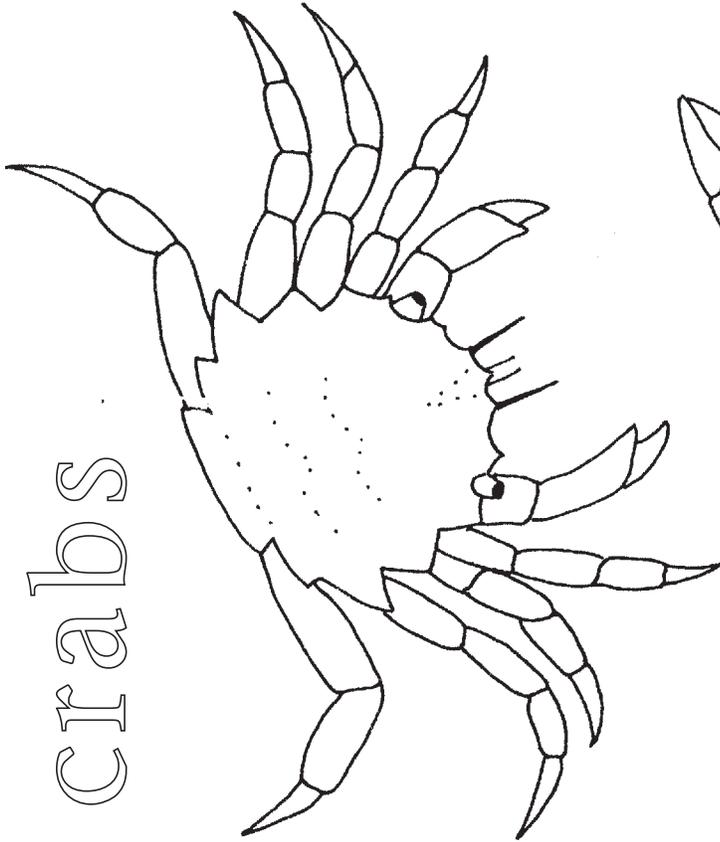
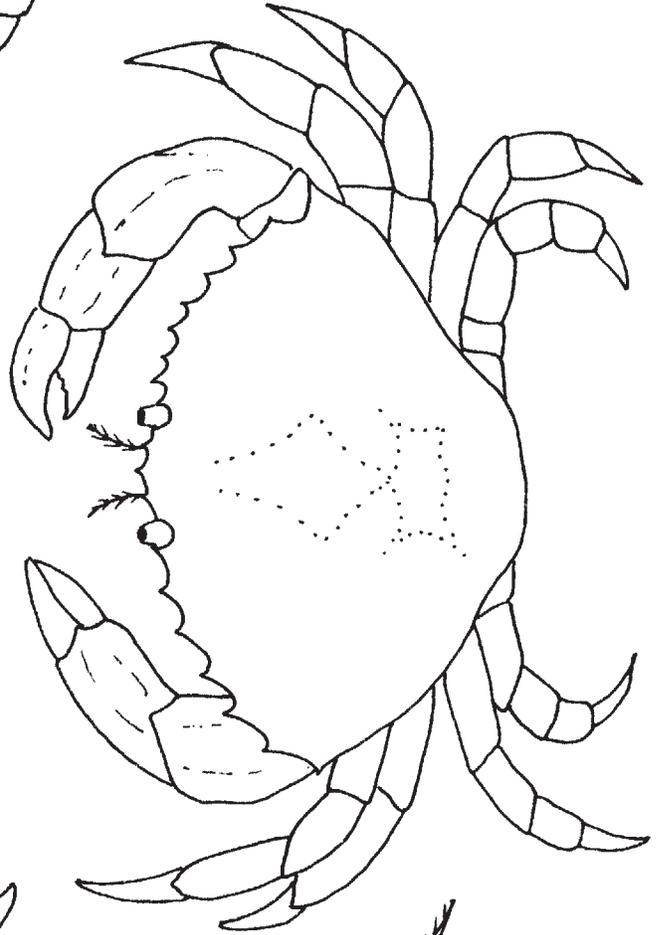
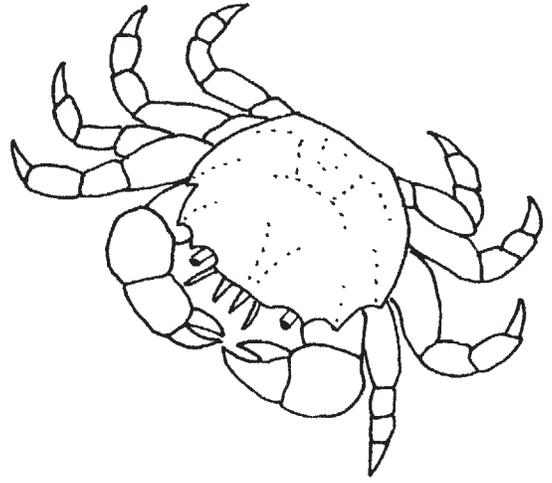
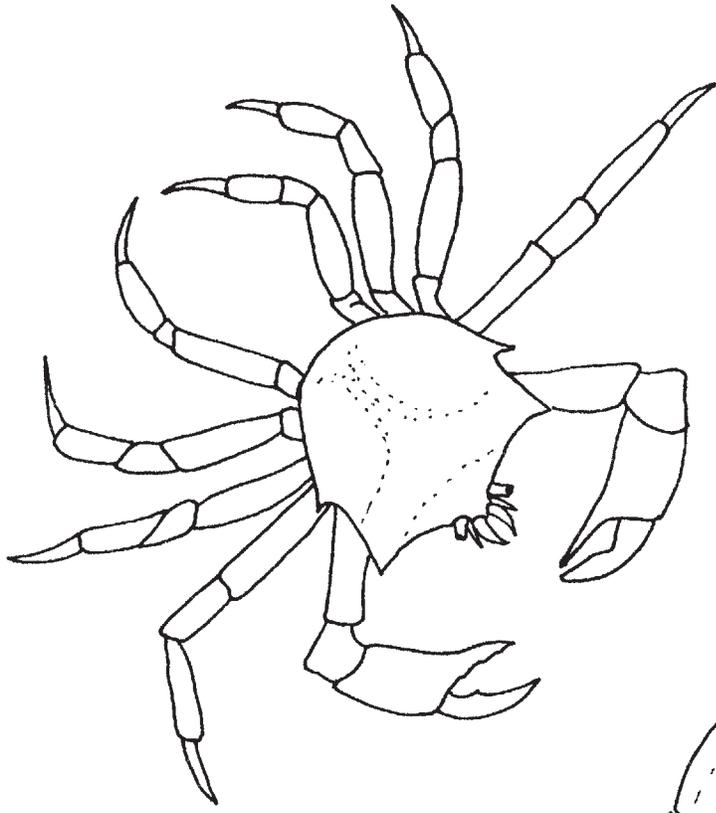
adult

spawning adults

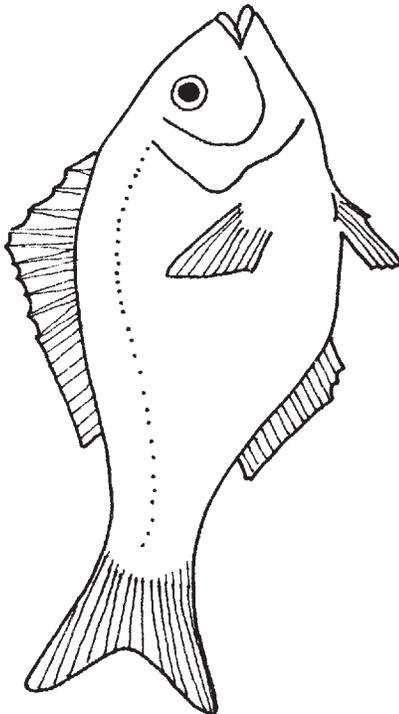
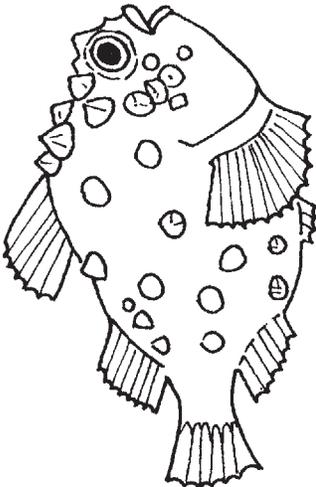
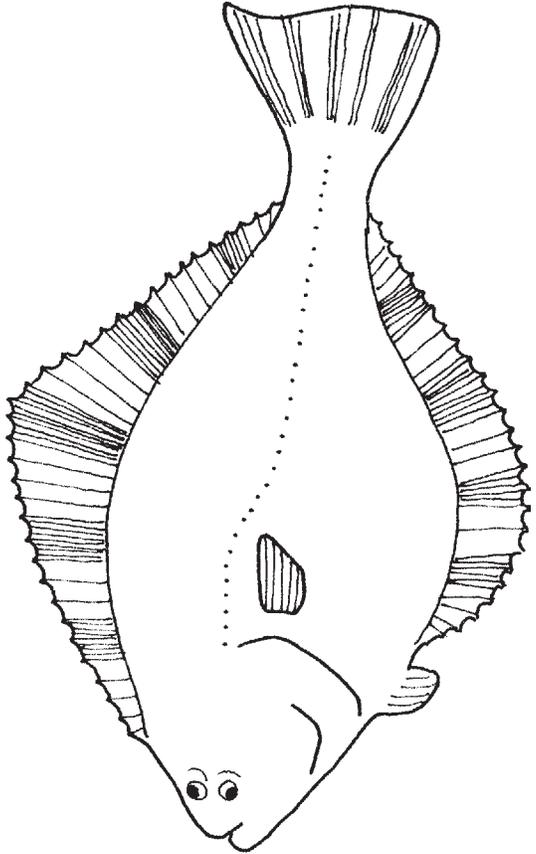
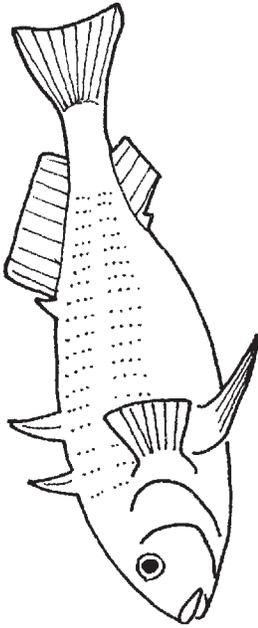
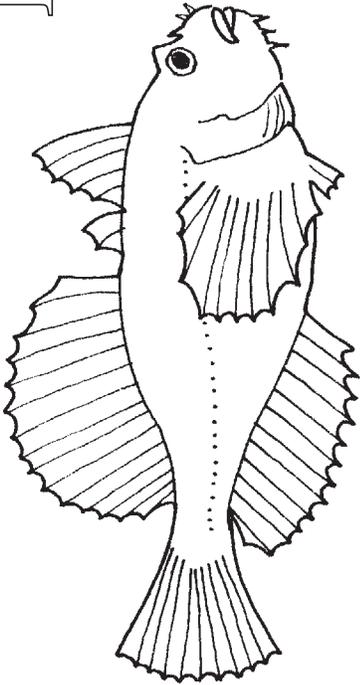
Help this salmon find shelter in the tall eelgrass.



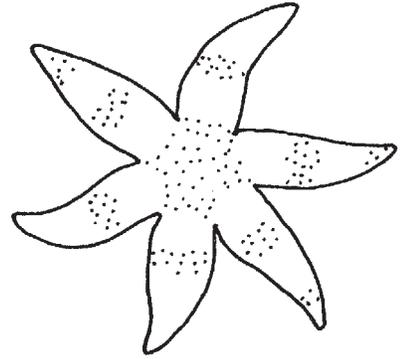
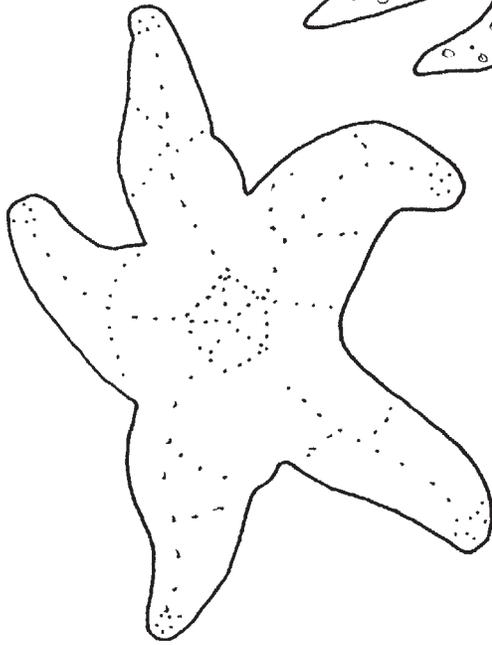
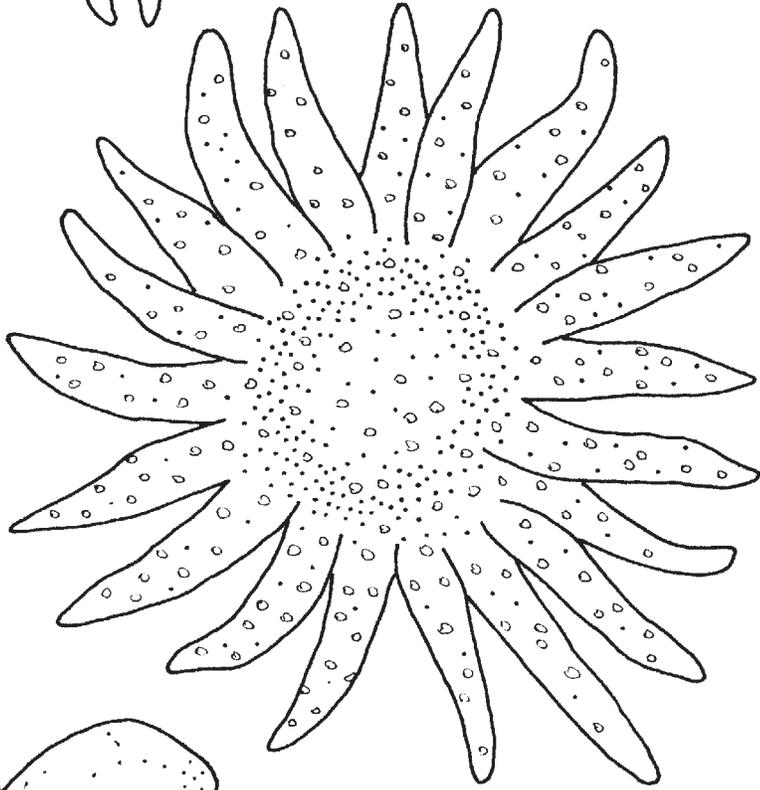
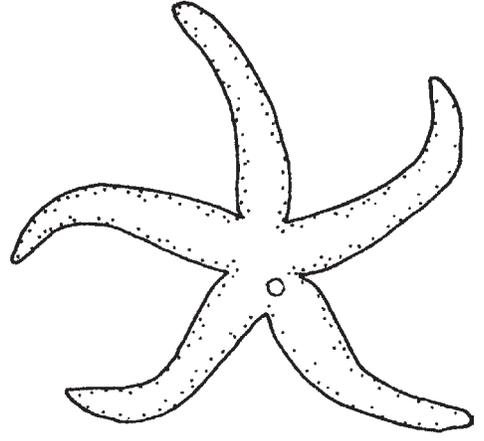
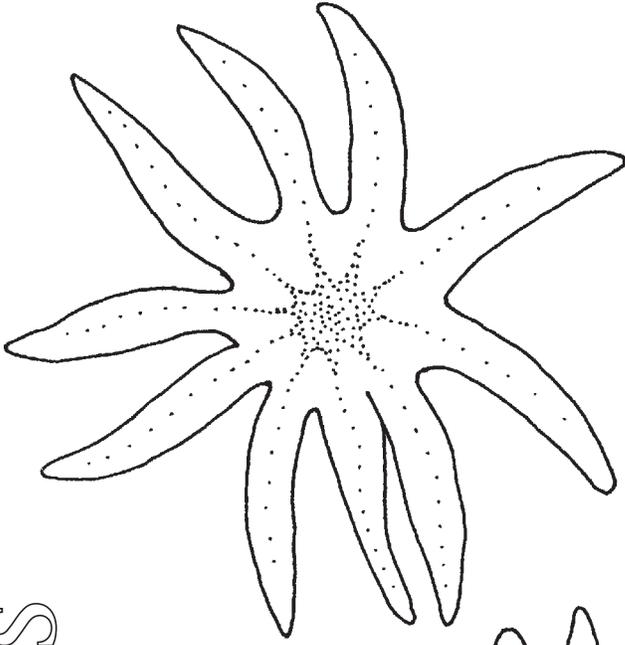
crabs

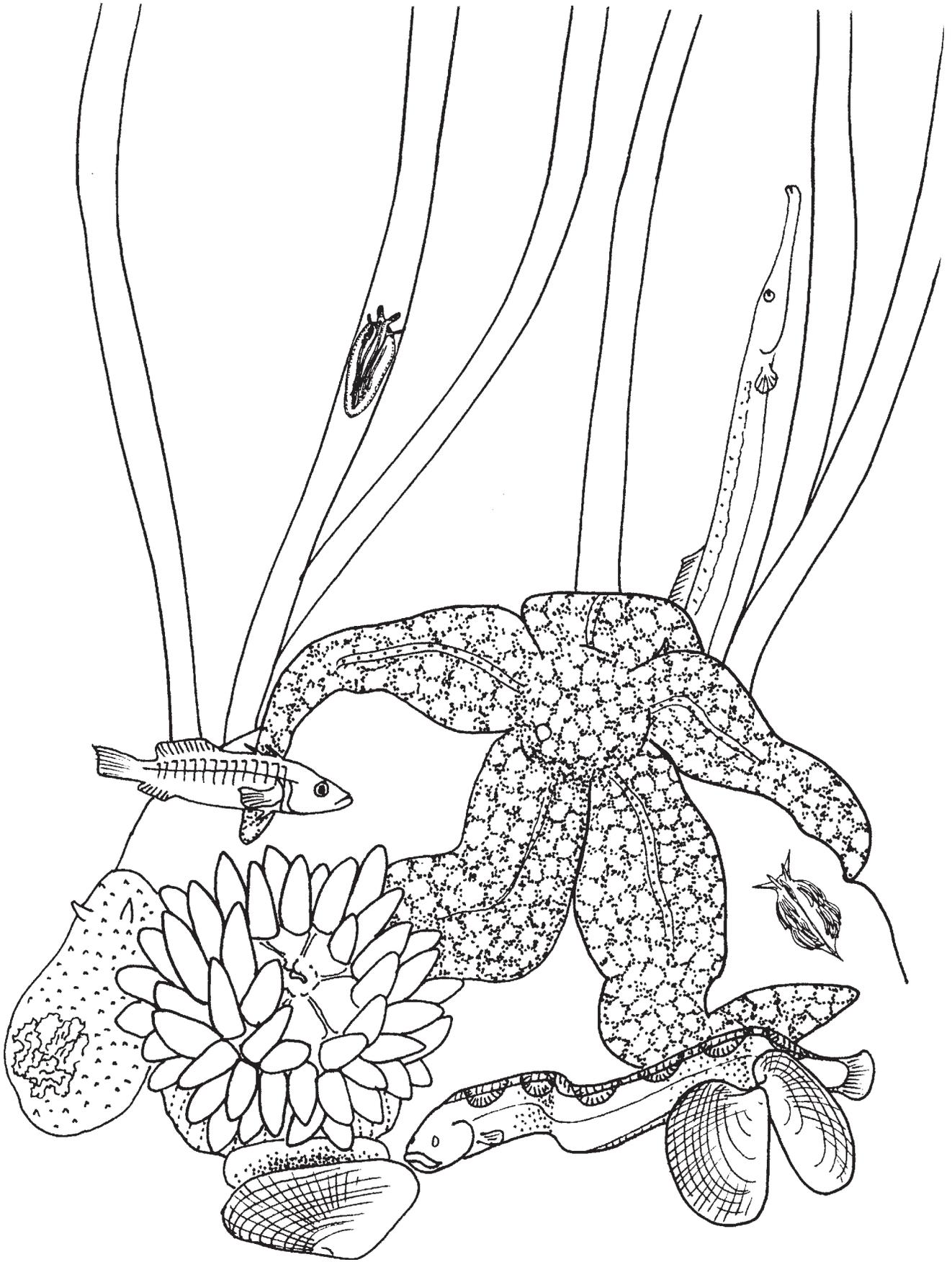


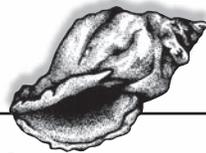
fish



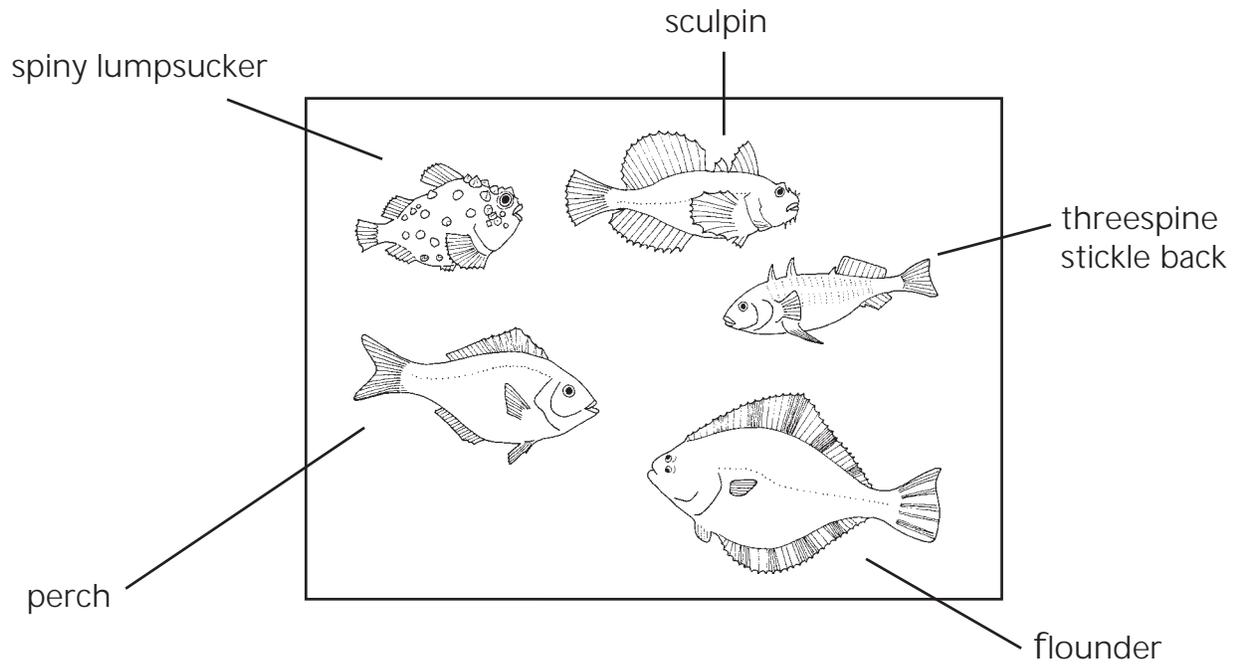
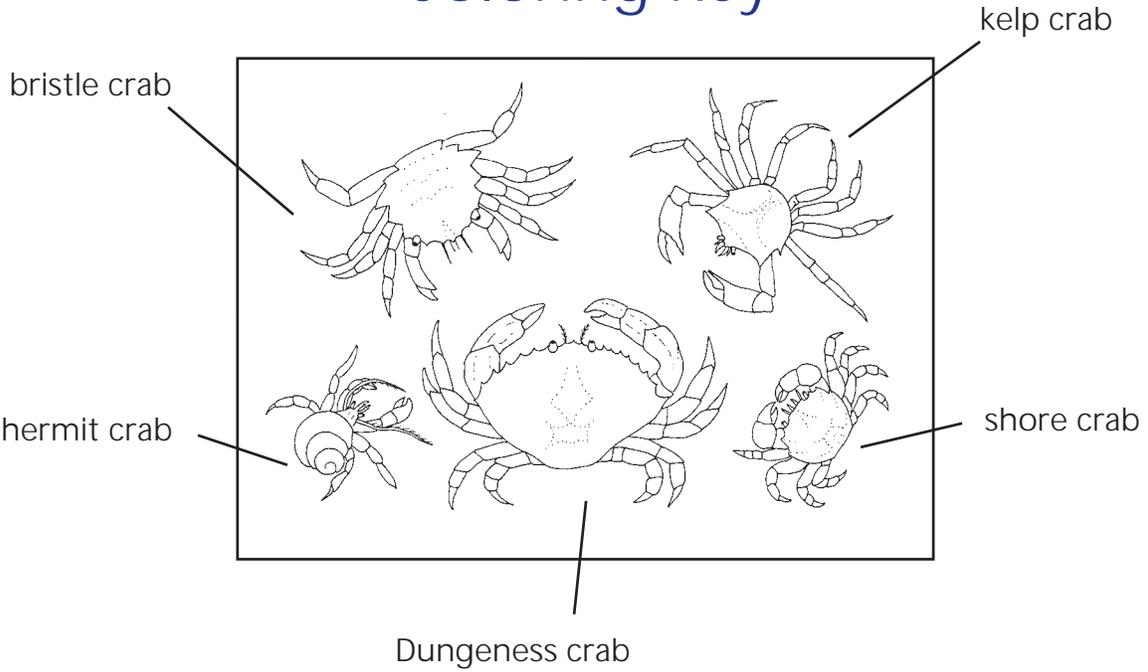
seastars

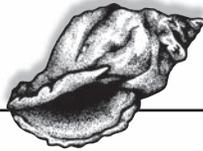




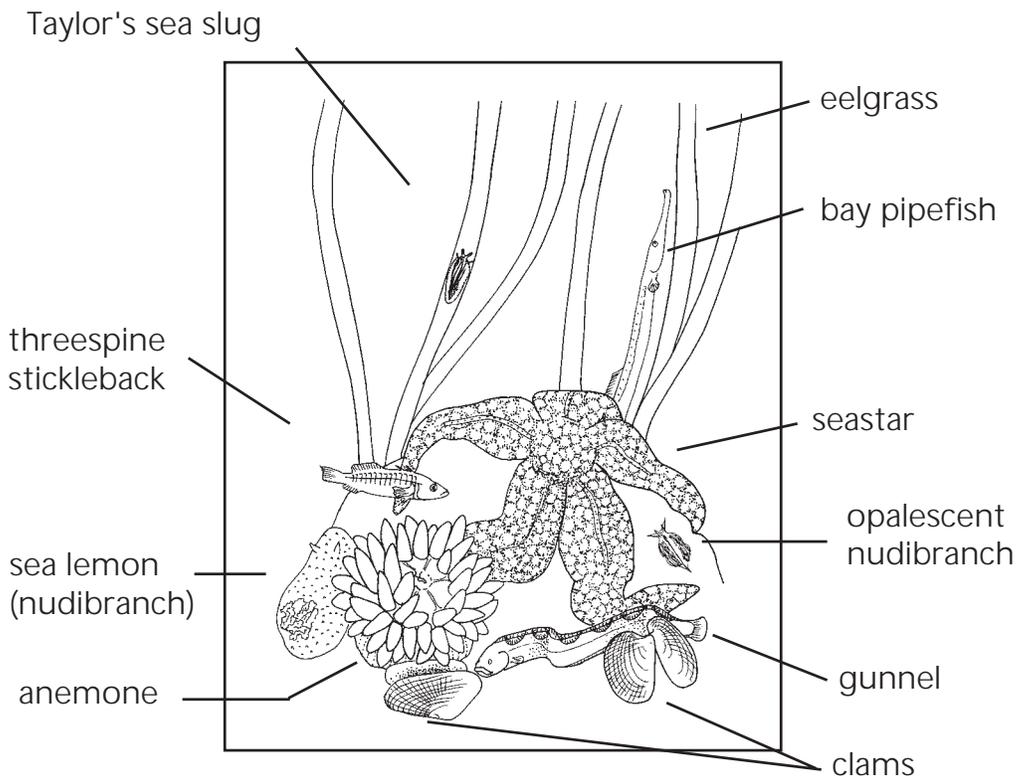
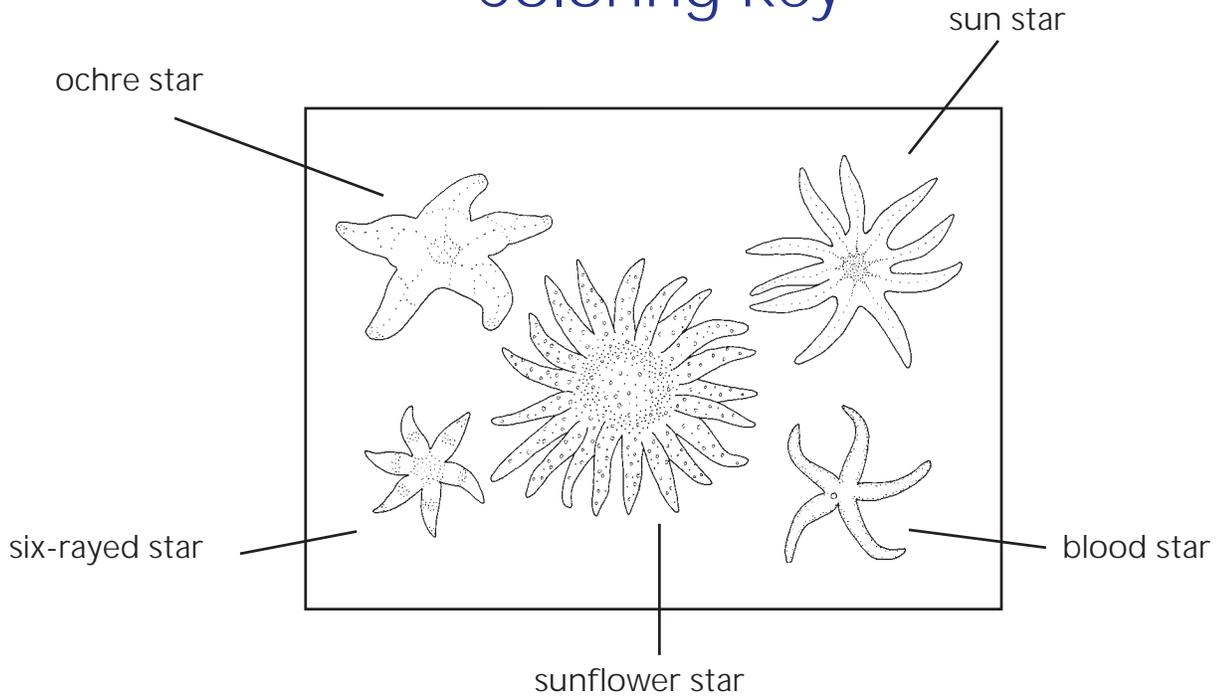


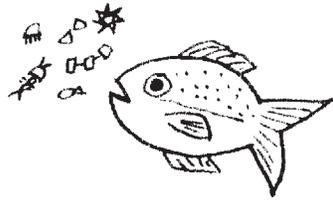
# Coloring Key



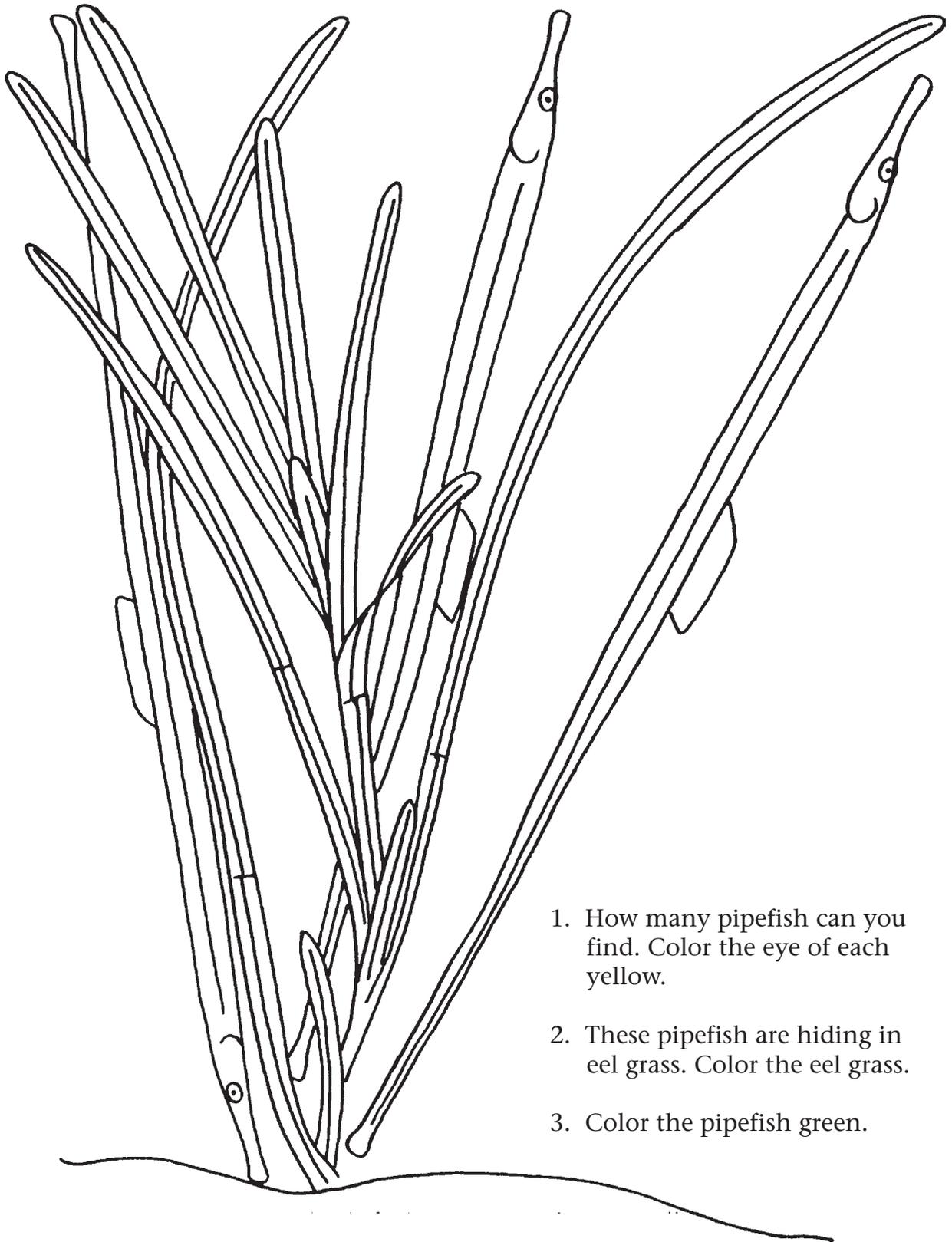


## Coloring Key

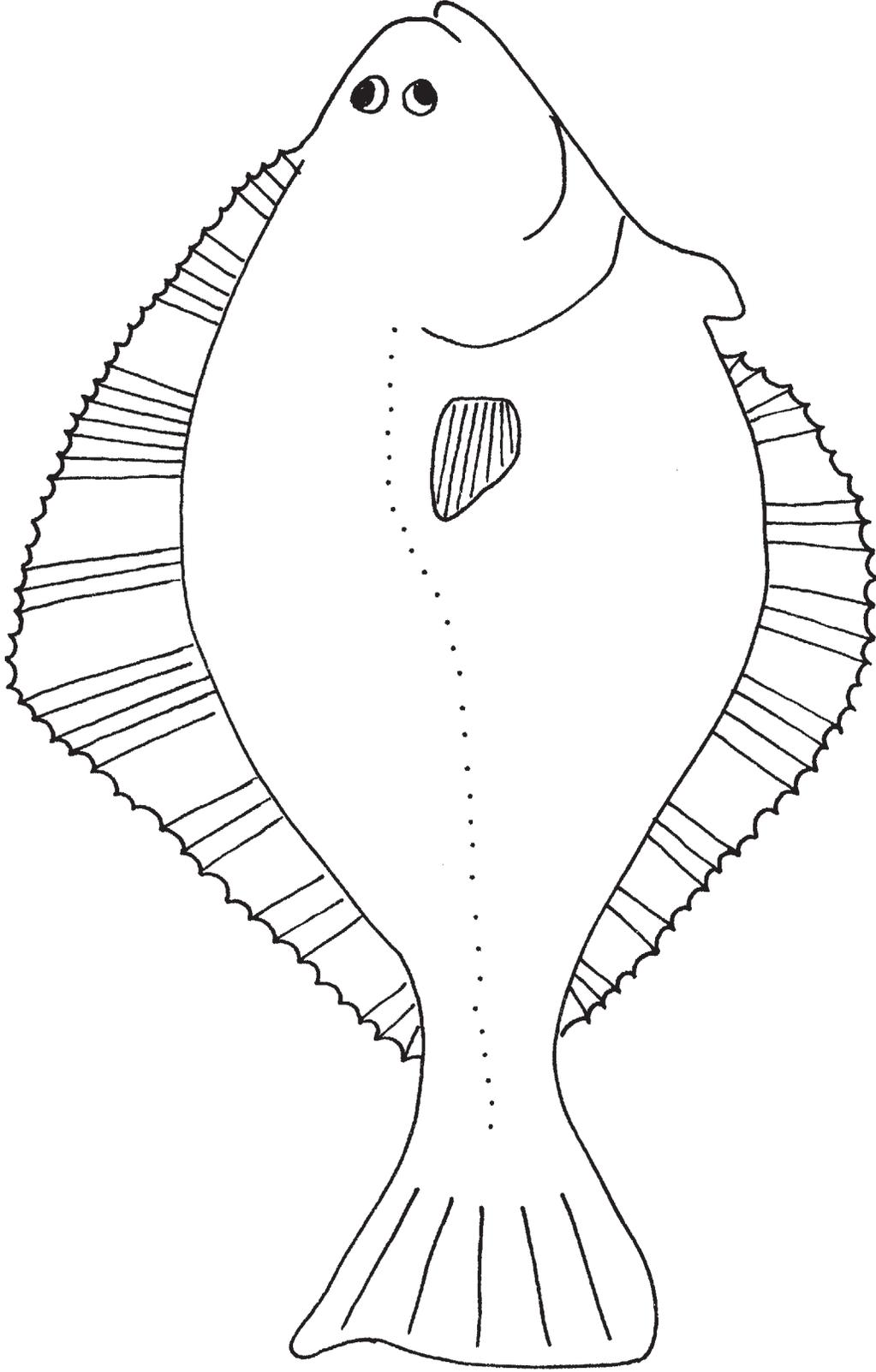




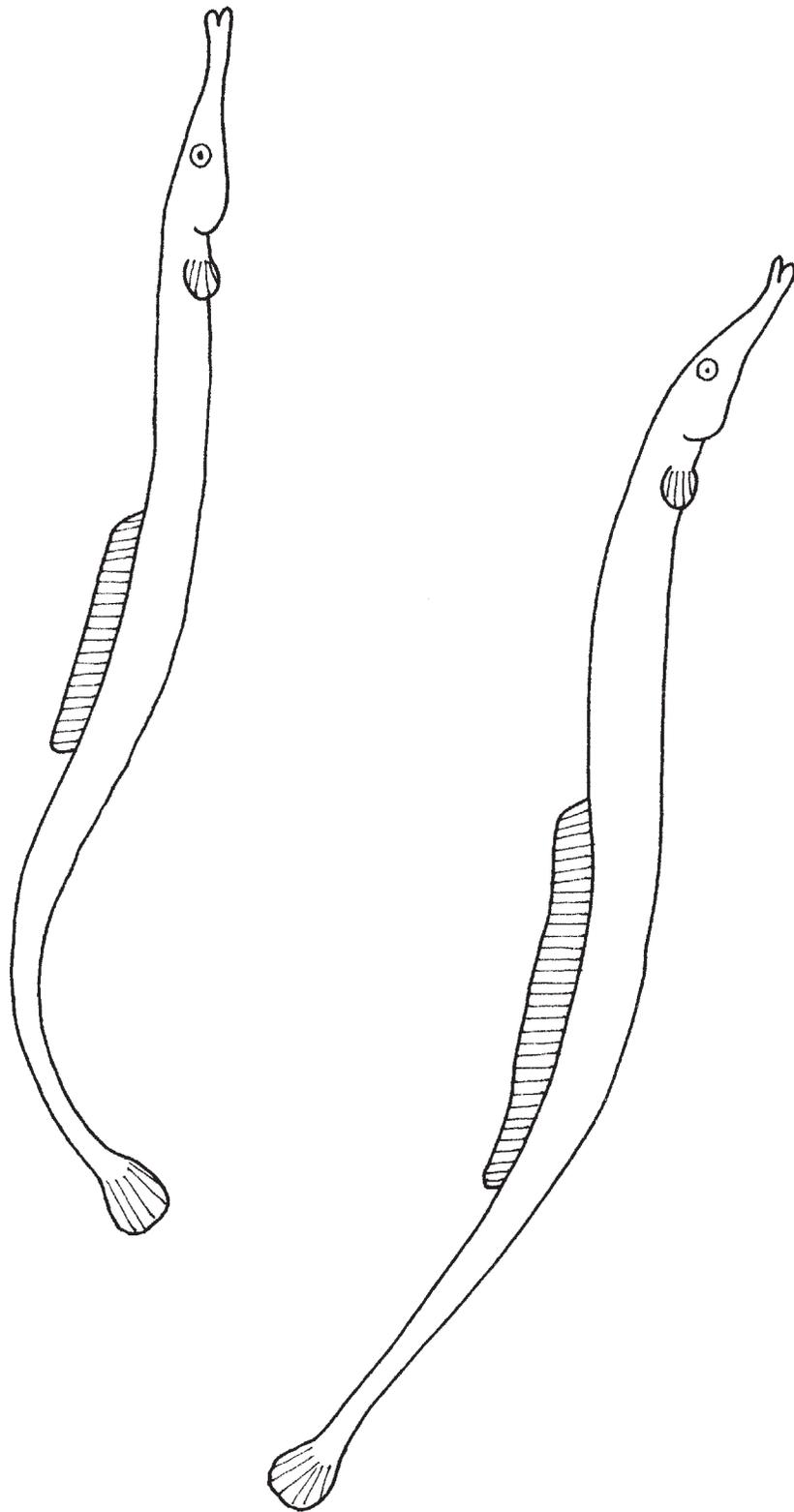
Many animals eat other animals. What might eat this fish?



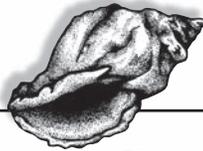
1. How many pipefish can you find. Color the eye of each yellow.
2. These pipefish are hiding in eel grass. Color the eel grass.
3. Color the pipefish green.



Flounder can change color quickly to match their surroundings.  
Give your flounder a background, then color the flounder to match.



Color the pipefish. Glue on green paper eelgrass to help them hide.



## The Camouflage Game

*This simple game demonstrates how camouflage works.*

Spread colored toothpicks or 1/2" squares of construction paper (5-10 pieces per student) around the playing area. An outdoor grassy or wooded area is best, but not necessary. Make the area large enough for your class to fit comfortably inside, but not so large that the toothpicks will get hopelessly lost. Try to have nearly equal numbers of each color - the more colors, the better.

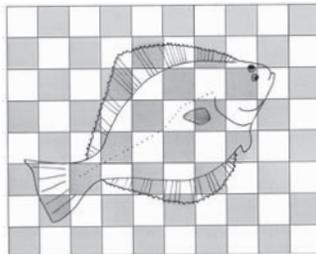
Give students a very short time (30 seconds) to look for the toothpicks. Put the whole group's collection together and see which colors they found. In a grassy area, there will most likely be very few green toothpicks in the collection. In a forest, browns and yellows may be missing.

Make a graph showing the number of each color found.

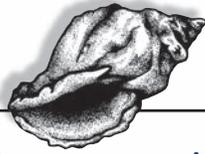
Send the children back into the play area to find the rest of the toothpicks. Which colors were the last to be found? Why?

Ask the class to name some animals that rely on camouflage for protection from predators.

You may want to have your students color the pipefish and/or flounder coloring pages as follow-up.

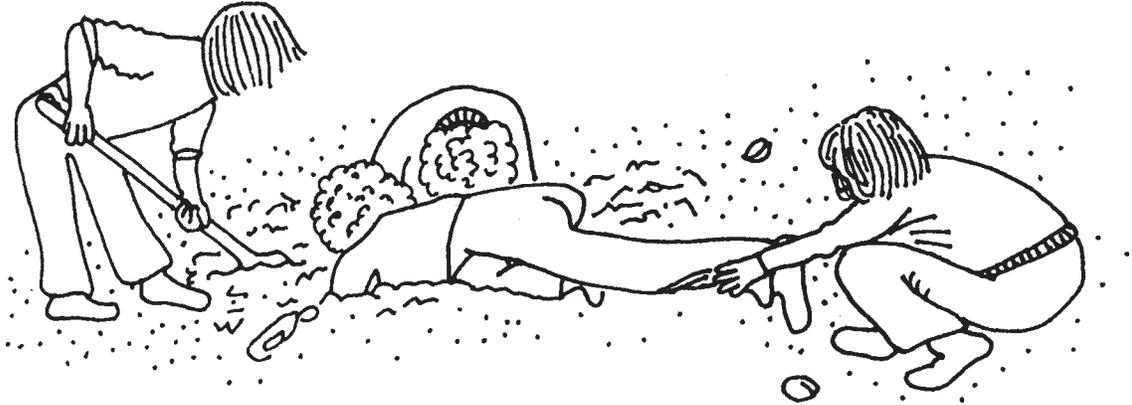


Flounder can change color quickly to match their surroundings.



## What's Happening Here?

Use your imagination. Look at this picture and write a story describing what is going on. Don't forget a title for your story.





## Afternoon In An Estuary

*This is a creative drawing (and listening) exercise to be read aloud to your class as they draw.*

Imagine that you are in a boat going down a river. After two hours of going downstream, you come to the mouth of the river where it meets the ocean. This area, where fresh water from the river meets the salt water from the ocean, is called an ESTUARY. In the center of your paper near the top, draw the boat on top of the water in the estuary . . .

Although the estuary will be deep where the main channel of the river is, it will be shallow along the shore and in much of the estuary itself. Draw some areas of shallow bottom under your boat . . . Now draw yourself lowering an anchor to measure the depth of the estuary . . . Leave the anchor on the bottom so the next tide does not carry you away. Now you have time to look down into the water.

Because the water is so shallow in an estuary, a lot of sunlight can get through the water to the plants that grow on the bottom. The river that flows into the estuary carries soil from the land, bringing lots of nutrients for the plants to use for making food. These nutrients, along with the sunlight and shallow water, allow many plants to grow. Draw lots of algae and eelgrass on the estuary's floor . . .

Many estuary plants are so tiny that one needs a microscope in order to see them! These plants are eaten by tiny animals. The tiny plants and animals that live suspended in the water are called PLANKTON. Draw lots of these microscopic plants and animals in the water under your boat . . .

Many animals like clams, mussels, barnacles and sponges eat this floating food by filtering it from the water. Draw some of the filter-feeders on the bottom of your estuary . . . When animals and plants die, they drift to the bottom and decay, becoming DETRITUS. Some kinds of worms eat this decaying matter. Draw several worms living in the muddy bottom . . .



## Afternoon In An Estuary

Small fish not only find food in an estuary, they can also hide from predators in the algae and eelgrass. Draw lots of little fish, feeding and hiding in the plants . . . Because there are so many little fish, larger fish will live in an estuary. Draw a large salmon looking for a tasty meal . . . Now draw an animal that might eat a salmon — for example, a harbor seal or bald eagle . . . Now that you know there are large salmon in your estuary, you are getting hungry. On the back of your paper, draw yourself eating a tasty meal from an estuary . . .

Adapted from “Clean Water, Streams, and Fish”,  
Washington State Office of Environmental Education





## Estuary Stories

***Read or tell a story that explains a natural phenomenon, and then let the students create their own tales.***

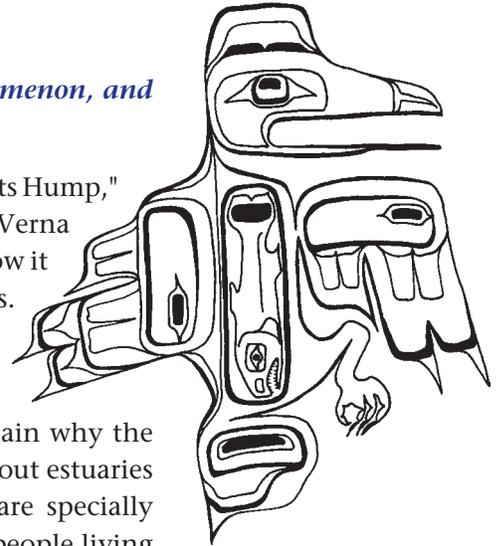
Rudyard Kipling's *Just So Stories* ("How the Camel got its Hump," etc.) and *Why Mosquitoes Buzz in People's Ears*, by Verna Aardema, are familiar examples of stories that tell "how it came to be." Choose a story to read aloud to your class. Collections from other cultures are good sources for such a tale.

Introduce the story by talking about tales that explain why the world is the way it is. After reading the story, talk about estuaries and how they work so well. Name animals that are specially adapted to live in their estuary habitat. Talk about people living near and using estuaries. Imagine what it would be like if estuaries or estuary animals were different, perhaps not so well adapted.

Have your students create their own stories about something in the estuary. (How the crab came to have claws, the great blue heron's long legs, why worms burrow into the mud, why the river always runs down to the sea, etc.) Send copies of your stories to Padilla Bay. We'd love to share them!

An excellent "estuary tale" is the Tahtlan story from Northern British Columbia which explains the tidal cycle. "Why the Tides Ebb and Flow" is the story of how Raven provided food for the people by making intertidal plants and animals available to them. Raven discovers a great big man sitting on a hole in the earth. If the man gets up, the water pours into the hole, the tide goes down, and people have food. By placing sharp rocks under the man, Raven convinces him to stand up twice every day, long enough to let the water recede so that the people can gather seafood on the shores.

"Why the Tides Ebb and Flow" can be found in the book, *How the People Sang the Mountains Up*, by Maria Leach, published in 1967 by Penguin Books. It is also available in the collection, *Wetland Tales*, published by Washington State Department of Ecology. Call the Publications Office at (360) 407-7472 for a free copy (Publication No. 92-17).



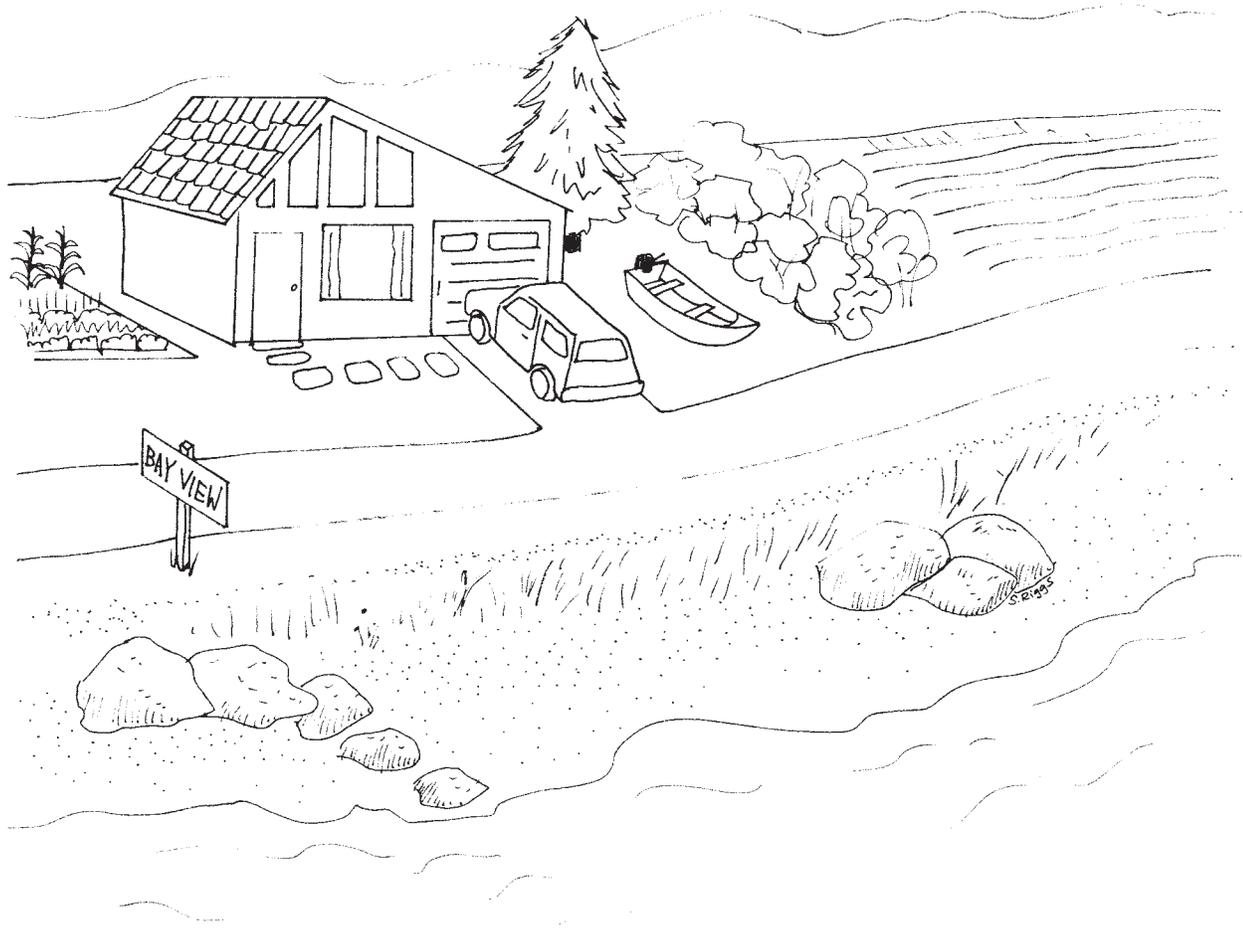




A Samish Home -- 1850's

### **Siehu's Story**

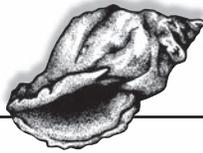
My name means heron. My home is built on the edge of Padilla Bay. It is made of cedar boards. My family travels only by water in a canoe that was carved out of a cedar tree. We get much of our food from the estuary. I help my mother gather clams, crabs, oysters, and seaweeds when the tide is low. My father and brothers fish and hunt birds that come to the estuary. In the summer, I like swimming in the bay. It is fun to see all the animals that live on the beach. All my friends and relatives live here, too. In the winter, it can get very cold and windy by the water, and everyone has to work hard to stay warm and have enough food to eat. Still, I am very happy to be living by Padilla Bay.



A Modern Home -- 2000's

### **Elisabeth's Story**

My home is a new house with cedar siding, built on the shore of Padilla Bay. Before it was built, the land here was a mudflat. The mudflat was diked and drained to make good farmland. Almost all of our food comes from a store in town, 12 miles away. We have a car and a motor boat. My parents both work in town. In the winter it is cold, wet, and windy here by the water. But in the summer I like to swim and play at the beach. Sometimes we dig for clams or go crabbing or fishing. We live far away from the mall and most of my school friends. Still, I am very happy that I live by Padilla Bay.



## Make a Food Chain

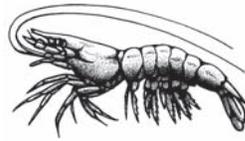
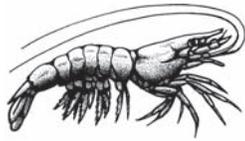
Each of the strips below makes a link in a food chain. Cut on the dotted lines and tape or staple the links together in the order you think is correct, beginning with the plants.

Then start adding links of your own. As you add estuary eaters, your chain will quickly become a **food web**.

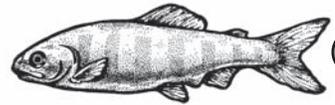
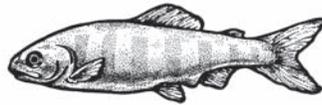
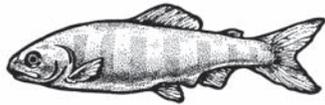
Extra: Add a link that says "Me" to a link that you like to eat.



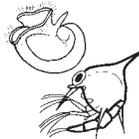
**Shrimp**



**Salmon**



**Zooplankton**

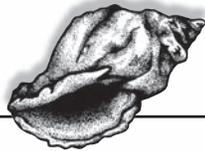


**Phytoplankton**



**Eagle**





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## Make a Food Chain

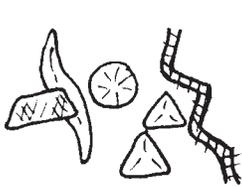
A series of ten horizontal dashed lines, each flanked by a gray circle on the left and a gray circle on the right, providing a template for writing a food chain.



# Food Chain Game

*Students role play an estuary food chain to learn about energy transfer and the challenges facing estuary animals.*

The food chain in this game consists of four links:



phytoplankton  
(popcorn)



zooplankton

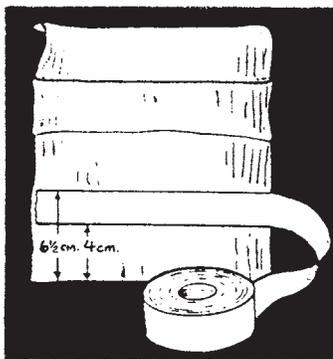


sculpins



great blue herons

Popcorn represents the phytoplankton. Students play the roles of zooplankton (plant eaters), sculpins (which eat zooplankton), and great blue herons (which eat the sculpins). Each student tries to get enough to eat without being eaten during the timed course of the game.



## You will need:

- 1 large paper bag of unsalted popcorn
- 1 timer
- roll of 1" masking tape
- 1 plastic sandwich bag (stomach) for each student. Place a strip of masking tape parallel to the bottom of the bag, 1 1/2" from the bottom.
- color coded "sashes" (fabric or paper)

For every 3 students, make 2 zooplankton sashes, 1 sculpin sash, and 1 great blue heron sash.

## How to play:

1. Briefly review food chains. Outline the boundaries of the game area, an area big enough for a controlled game of tag. This game is best played outdoors or on an uncarpeted area.
2. Spread the phytoplankton (popcorn) over the area. Tell your class you are spreading out the phytoplankton for the zooplankton to eat.



## Food Chain Game

3. Divide the students into 3 groups and distribute the sashes and plastic bag stomachs. Give one group **zooplankton** sashes and tell them they need to fill their plastic bags with popcorn to the bottom of the tape to survive. Give a second group **sculpin** sashes and instruct them to fill their bags to the top of the tape. The third group gets **great blue heron** sashes and must fill their stomach to the top to survive. Great blue herons tag sculpins. Sculpins eat zooplankton, and zooplankton eat the phytoplankton (popcorn). If a great blue heron tags a sculpin the sculpin must surrender the contents of its stomach and leave the game. If a sculpin tags a zooplankter, the zooplankter must surrender the contents of its stomach to the sculpin and leave the game.
4. Set the timer for five minutes and "GO!" The first game usually lasts only a few seconds with one of two things happening. The zooplankton are gobbled up before they have a chance to forage, or the sculpin are gobbled up and the zooplankton continue to eat popcorn.
5. Record the number of each kind of animal that survived. Have students suggest rules that might allow all four links of the chain to still have survivors after five minutes of play. Suggestions may include:
  - a. Change the ratio of zooplankton to sculpins and herons.
  - b. Let each zooplankter come back as another zooplankter once after being captured and transferring its stomach contents.
  - c. Provide a "safety zone" for zooplankton and /or sculpins.
  - d. Timed releases. Let zooplankton go first to forage. After one minute, release the sculpins, and then one minute later, the herons.
6. Replay the game and modify your rules several times until a balance is achieved.

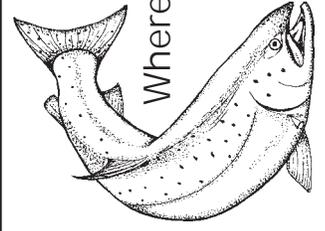
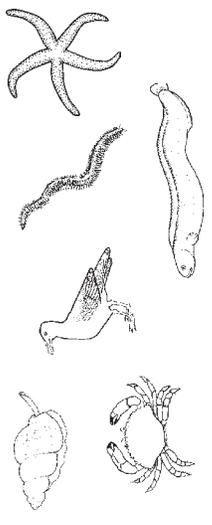
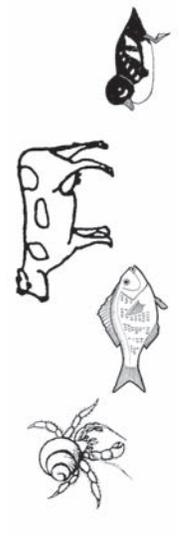
**Conclusion:** Analyze the results of each game. Compare this game to a real food chain. How are your rules similar to or different from how it really works?

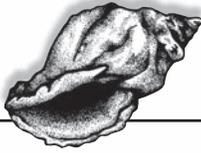
How about making extra popcorn to eat?!

# Padilla Bay

# Whiz Quiz

My name is \_\_\_\_\_

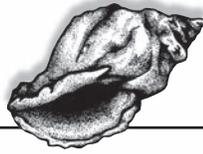
<p>What 2 kinds of water mix in an estuary?</p> <p>1. _____ 2. _____</p>	<p>Do you like to eat:</p> <table border="0"> <tr> <td></td> <td>yes</td> <td>no</td> </tr> <tr> <td>1. clams</td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> <tr> <td>2. crabs</td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> <tr> <td>3. oysters</td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> <tr> <td>4. salmon</td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> <tr> <td>5. seaweed</td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> </table>		yes	no	1. clams	<input type="checkbox"/>	<input type="checkbox"/>	2. crabs	<input type="checkbox"/>	<input type="checkbox"/>	3. oysters	<input type="checkbox"/>	<input type="checkbox"/>	4. salmon	<input type="checkbox"/>	<input type="checkbox"/>	5. seaweed	<input type="checkbox"/>	<input type="checkbox"/>	<p>Draw an animal that swims with the tide.</p>
	yes	no																		
1. clams	<input type="checkbox"/>	<input type="checkbox"/>																		
2. crabs	<input type="checkbox"/>	<input type="checkbox"/>																		
3. oysters	<input type="checkbox"/>	<input type="checkbox"/>																		
4. salmon	<input type="checkbox"/>	<input type="checkbox"/>																		
5. seaweed	<input type="checkbox"/>	<input type="checkbox"/>																		
<p>Draw an animal living in mud.</p> 	<p>Where do salmon hatch?</p> 	<p>Circle the animal with one foot.</p> 																		
<p>Floating plants and animals are called _____</p> 	<p>"X" the animal that doesn't belong in an estuary.</p> 	<p>Draw an animal that lives on rocks.</p> 																		



---

## The Eating Song

1. This is the way the seastar eats,  
The seastar eats, the seastar eats.  
This is the way the seastar eats,  
Slipping its stomach inside the clam.
2. Clam --  
Slurping its food through its siphon.
3. Amphipod --  
Chewing detritus on the beach.
4. Barnacle --  
Catching plankton with feathery feet.
5. Anemone --  
Grabbing food with its tentacles.
6. Limpet --  
Scraping up plants with its jagged tongue.
7. Crab --  
Slicing up meat with its pinchers.



## Three Little Salmon

(Tune: Three Little Fishes)

1. Down in the meadow in an itty bitty pool  
Swam three little salmon where the water was cool.  
"Swim" said a voice, "swim if you can"  
And they swam and they swam right over the dam.

**Boomp boomp ditum dattum wattum choo  
Boomp boomp ditum dattum wattum choo  
Boomp boomp ditum dattum wattum choo  
They swam and they swam right over the dam.**

2. Down in the estuary they got fat  
Eating copepods and amphipods and things like that.  
Then the three little salmon went off on a spree  
And they swam and they swam right out to the sea.

**Boomp boomp ditum dattum wattum choo . . .  
They swam and they swam right out to the sea.**

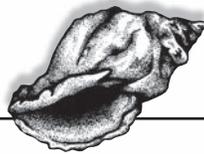
3. "Help," cried the salmon, "look at the whales!"  
Seals and tuna were hot on their tails.  
Then came that voice, it said, at last,  
"Go back to the place that you were hatched."

**Boomp boomp ditum dattum . . .**

4. Swimming up the river came the salmon run.  
They couldn't stop for anything, no time for fun.  
When they came to the dam they could not stop.  
They had to get over the top.

"Jump!" said the voice, "No time for rest."  
"Jump!" said the voice and they jumped their best.  
Some had to try three or four times.  
Then they swam and they swam right over the dam.

**Boomp boomp ditum dattum . . .**



## Eelgrass Song

(Food chain version)

Call and response song to the tune of "The Green Grass  
Grew All Around"

Oh Padilla is a bay.

*Oh Padilla is a bay.*

And it is an estuary.

*And it is an estuary.*

'Bout the prettiest estuary

*'Bout the prettiest estuary*

That you ever did see

*That you ever did see*

**Oh, Padilla is a bay and it is an estuary,  
and the eelgrass grows all around, all around,  
and the eelgrass grows all around.**

Now in that bay,

There is an eagle.

'Bout the prettiest eagle

That you ever did see.

**Oh the eagle's in the bay and the bay's an estuary,  
and the eelgrass grows all around, all around,  
and the eelgrass grows all around.**

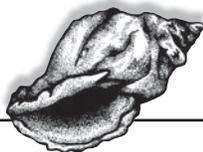
Now in that eagle, there is a duck . . .

Now in that duck, there is a crab . . .

Now in that crab, there is a copepod . . .

Now in that copepod, there is detritus . . .

**and the eelgrass grows all around, all around,  
and the eelgrass grows all around.**



## Eelgrass Song

(Botany Version)

Oh Padilla is a bay.

*Oh Padilla is a bay.*

And it is an estuary.

*And it is an estuary.*

'Bout the prettiest estuary

*'Bout the prettiest estuary*

That you ever did see

*That you ever did see*

**Oh, Padilla is a bay and it is an estuary,  
and the eelgrass grows all around, all around,  
and the eelgrass grows all around.**

Now in that bay,

*Now in that bay,*

There was some mud.

*There was some mud.*

'Bout the prettiest mud

*'Bout the prettiest mud*

That you ever did see.

*That you ever did see.*

**Oh, the mud was in the bay and the bay's an estuary,  
and the eelgrass grows all around, all around,  
and the eelgrass grows all around.**

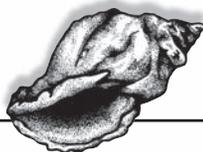
Now in that mud, there was a root.

Now on that root, there was a blade . . .

Now on that blade, there was a flower . . .

Now on that flower, there was a seed . . .

**and the eelgrass grows all around, all around,  
and the eelgrass grows all around**



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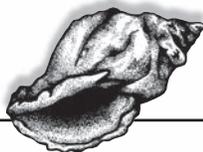
## Did You Ever See a Barnacle?

(Tune: Did You Ever See a Lassie?)

Did you ever see a barnacle, a barnacle, a barnacle?  
Did you ever see a barnacle go this way and that?  
Go this way and that way  
Go this way and that way  
Did you ever see a barnacle go this way and that?

2. Jellyfish
3. Some eelgrass
4. Heron
5. Eagle
6. Crab
7. Anemone
8. Pipefish
9. Worm
10. . . .

This is a good action song!



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# Roll On Columbia, Roll On

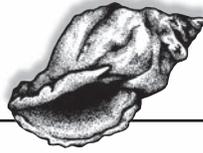
by Woody Guthrie

Green Douglas firs where the waters cut through  
Down her wild mountains and canyons she flew  
Canadian Northwest to the ocean so blue  
Roll on, Columbia, roll on.

**Roll on, Columbia, roll on**  
**Roll on, Columbia, roll on**  
**Your power is turning our darkness to dawn**  
**So roll on, Columbia, roll on.**

Other great rivers add power to you  
Yakima, Snake and the Klickitat too  
Sandy Willamette and Hood River too  
It's roll on, Columbia, roll on.

Try adapting this song to your local river. Let the kids make up verses. (Roll on, Skagit, roll on . . .)



---

## If You're a Crab and You Know It

(Tune: "If You're Happy and You Know It")

If you're a **crab** and you know it, walk sideways.  
If you're a crab and you know it, walk sideways.  
If you're a crab and you know it, then your walk will surely show it.  
If you're a crab and you know it, walk sideways.

If you're a **seastar** and you know it, stretch your arms.  
If you're a seastar and you know it, stretch your arms.  
If you're a seastar and you know it, then your arms will surely show it  
If you're a seastar and you know it, stretch your arms.

If you're a **jellyfish** and you know it, float around.  
If you're a jellyfish and you know it, float around.  
If you're a jellyfish and you know it, then your shape will surely show it.  
If you're a jellyfish and you know it, float around.

If you're a **clam** and you know it, close your shells.  
If you're a clam and you know it, close your shells  
If you're a clam and you know it, then your shells will surely show it.  
If you're a clam and you know it, close your shells.

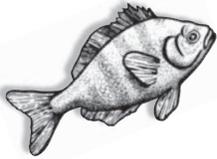
If you're a **worm** and you know it burrow down.  
If you're a worm and you know it burrow down.  
If you're a worm and you know it, then your squirms will surely show it.  
If you're a worm and you know it burrow down.

Now add your own verses . . .



## More Ideas

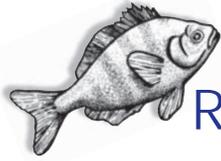
- Make a list of words describing an estuary. Turn them into a poem.
- Write a story from the point of view of an animal living in an estuary.
- Write a letter to Padilla Bay on how you felt about your trip and what you experienced there. You may want to give students questions to answer in their letters. For example: Why are estuaries important? What can you do to help estuaries?
- Write a riddle about a "sea treasure." Have others guess.
- Make chimes from driftwood and clam shells.
- Make Japanese fish prints (Gyotaku). Latex house paint washes up easily and is permanent on T-shirts or cloth when dry.
- Create a mural of an estuary and have each student add an animal or plant. Fish prints, shell rubbings and tissue paper eelgrass make interesting additions.
- Color egg carton "barnacles." Cut apart sections of an egg carton. Use 2" pieces of pipe cleaner for the feathery feet. The feet can be pulled in as the tide goes out.
- Make a list of the foods we eat that come from an estuary.
- Talk about seaweed and its nutritional value. Investigate what foods are made with algin and carrageenan, derivatives of seaweeds.
- Visit an Asian market or talk to a Japanese chef. Taste some seaweed products.
- Play fish net tag. Three people hold hands to form the net. Everyone else is a fish. When the net tags a fish, the fish joins on to become part of the net. Continue until everyone is in the net. This is a game without losers!
- Play charades: Have students act out how an animal moves or eats for the rest of the class to guess. Have a group of students act out an estuary food chain.



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## Resources

### Children's Books

Baldwin, Robert F. *This is the Sea that Feeds Us*. Nevada City, CA: Dawn Publications, 1998. A catchy rhyme about the marine food web—including humans.

Carle, Eric, *A House for Hermit Crab*, Saxonville, Massachusetts: Picture Book Studio, Ltd., 1987. Colorfully illustrated story of a hermit decorating its shell only to outgrow it and move on.

Cole, Joanna, *The Magic School Bus at the Water Works*. New York: Scholastic Inc., 1990. Ms. Frizzle's look at how we use water.

Cole, Joanna, *The Magic School Bus on the Ocean Floor*. New York: Scholastic Inc. 1992. Fanciful tale of a field trip to the ocean floor.

Cole, Sheila, *When the Tide is Low*, New York: Lothrop, Lee & Shepard Books, 1985. A lyrical story of waiting for the tide. A good introduction to tides and the seashore.

Cone, Molly, *Come Back Salmon*, San Francisco: Sierra Club books for Children, 1992. An exciting account of students in Everett, WA who clean up their stream to restore a historical salmon run.

Dean, Jana, *Wetland Tales; A Collection of Stories for Wetland Education*, Washington State Department of Ecology Publication # 92-17. Delightful stories from the oral traditions of many cultures.

Glaser, Michael, *Does Anyone Know Where a Hermit Crab Goes?*, Massachusetts: Knickerbocker Publishing company, 1983. A charmingly simple poem about the adventures of a hermit crab.

Crewe, Sabrina, *The Salmon*. Austin: Raintree Steck-Vaughn Publishers, 1997. Basic and simple salmon facts.

Holling, Holling Clancy, *Pagoo*, Boston: Houghton Mifflin Company, 1957. A classic tale about the often dramatic encounters of a young hermit crab, full of "lessons."

James, Simon, *Sally and the Limpet*, New York: Macmillan Publishing Co., 1990. A comical tale with a conservation message.

Lionni, Leo, *Fish is Fish*, New York: Pantheon, 1970. A wonderful story about fish, easily understood by preschoolers.

Waterton, Betty, *A Salmon for Simon*, Vancouver, B.C.: Douglas & McIntyre, 1978. How a small boy saves the life of the salmon he intended to catch.

Peters, Lisa Westberg, *The Sun, the Wind, the Rain*, New York: Henry Holt & Co, 1988. A simple story of coastal geology.



# Resources

## Magazines

### ***Clearing: Nature and Learning in the Pacific Northwest***

Environmental Education Project

PO Box 751

Portland, OR 98207

A valuable network of people and places, information on happenings, ideas, activities and resources for teaching about the environment.

### ***Naturescope Our Big Backyard, and Ranger Rick***

National Wildlife Federation

1412 Sixteenth Street, NW

Washington, D.C. 20036-3366

Wildlife education curriculum and outstanding childrens magazines

## Reference Books

Berrill, J.J. and Jacquelyn, ***1001 Questions Answered About the Seashore***, New York: Dover Publications, 1957.

Coulombe, Deborah, ***The Seaside Naturalist***, New York: Prentice-Hall, Inc., 1984.

Flora, Charles and Eugene Fairbanks, M.D., ***The Sound and the Sea***, Bellingham, WA: Western Washington Press, 1983.

Kozloff, Eugene, ***Seashore Life of the Northern Pacific Coast***, Seattle: University of Washington Press, 1983.

Snively, Gloria, ***Exploring the Seashore of British Columbia, Washington and Oregon***, Vancouver, BC: Gordon Soules Book Publishers Ltd., 1978.

Yates, Steve, ***Marine Wildlife***, Connecticut: The Glove Pequot Press, 1988.

Zim, Herbert and Lester Ingle, ***Seashores: A Guide to Animals and Plants Along Beaches***, New York: Golden Guide Press, 1955.

## Curricula

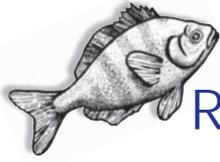
### **Alaska Sea Week Curriculum Series**

Alaska Sea Grant College Program

University of Alaska

Fairbanks, AK 90701

A wonderful series of interdisciplinary beach and classroom activities in all aspects of marine studies, for elementary grades; award winner



## Resources

### ***Aquatic Project Wild***

Project Wild Coordinator

Washington State Department of Fish and Wildlife

600 Capital Way North

Olympia, WA 98501-1091 (360) 902-2200

A compilation of diverse, interdisciplinary activities for all ages. Available through teacher workshops only.

### ***Project WET***

Rhonda Hunter, Project Coordinator

Washington State Department of Ecology

PO Box 47600

Olympia, WA 98504-7600 ((360) 407-6145

An interdisciplinary water education program promoting awareness, appreciation, knowledge and stewardship of water resources. Available through teacher workshops. K-12.

### ***ORCA: Ocean Related Curriculum Activities***

Marine Education Project

Pacific Science Center

200 Second Avenue N

Seattle, WA 98109 (206) 443-2001

"High Tide, Low Tide" and "Life Cycle of the Salmon" for grades 3-4 can be adapted for lower grades; excellent information and activities.

### ***Project For Sea***

Marine Science Center

PO Box 2079

Poulsbo, WA 98370 (360) 779-5549

Extensive and exemplary curriculum includes animal and plant identification and ecological concepts; award winner.

### ***The Seattle Aquarium Curriculum***

The Seattle Aquarium

Pier 59, Waterfront Park

Seattle, WA 98101 (206) 622-1868

Curriculum for all grades, preschool as well, to supplement visits to the aquarium; teacher information, pre- and post-visit activities included.

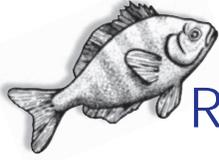
### ***Naturescope***

National Wildlife Federation

1412 Sixteenth Street, NW

Washington, D.C. 20036-3366

A wonderful series of books filled with easy to use activities and lessons on topics such as oceans, birds, mammals, and wetlands.



## Resources

### Places

#### **Bellingham Maritime Heritage Center**

1600 Centre Street  
Bellingham, WA 98225  
(360) 676-6806  
Salmon hatchery; education programs available.

#### **Marine Life Center**

1801 Roeder Ave.  
Bellingham, WA 98225  
(360)671-2431  
Touch tanks, aquaria with NW animals; education programs available.

#### **Point Defiance Zoo & Aquarium**

5400 North Pearl Street  
Tacoma, WA 98407  
(206) 591-5335  
An exemplary zoo with aquariums; education programs available.

#### **Port Townsend Marine Science Center**

Fort Worden State Park  
Port Townsend, WA 98368  
(360) 385-5582  
Touch tanks and exhibits; education programs available.

#### **Poulsbo Marine Science Center**

PO Box 2079  
Poulsbo, WA 98370  
(360) 779-5549  
Marine center with comprehensive school programs.

#### **The Seattle Aquarium**

Pier 59, Waterfront Park  
Seattle, WA 98101  
(206) 622-1868  
Extensive aquariums and exhibits; school programs.

#### **The Whale Museum**

62 First Street N  
Friday Harbor, WA 98250  
(360) 378-4710  
Museum and research dedicated to whales; elementary curriculum.

#### **Washington State Office of Environmental Education**

2800 NE 200th  
Seattle, WA 98155  
(206) 365-3893  
A resource center; offers curriculum materials, films, videos, workshops.



# Resources

## Organizations

### **Northwest Association of Marine Educators (NAME)**

Kathleen Heidenreich  
W 697 Elk Ridge Road  
Shelton, WA 98584

An active organization of educators and enthusiasts interested in marine and aquatic education in Alaska, British Columbia, Washington, and Oregon. NAME is the regional chapter of the National Marine Education Association (NMEA).

### **Environmental Education Association of Washington (EEAW)**

PO Box 4122  
Bellingham, WA 98227

Promotes environmental education in Washington; sponsors annual conference.

### **Salish Sea Expeditions**

271 Wyatt Way NE #102  
Bainbridge Island, WA 98110  
(206) 780-7848

Offers classroom study and boat-based field research opportunities in Puget Sound.

### **Sound Experience**

2310 Washington Street  
Port Townsend, WA 98368  
(360) 379-0438

Environmental Education and Marine Science programs on board the 101 foot historic schooner, *Adventuress*.

## Musical Recordings

*Salish Sea*, Holly Arntzen and the Saltwater Singers, ©2000 Artist Response Team (ART), PO BOX 91, Brentwoor Bay, BC V8M1R3  
(250) 544-4006, art@pacificcoast.net

Singable songs with a strong environmental message. The "Salish Sea." refers to waters of northern Puget Sound, the Georgia Strait and the Strait of Juan de Fuca.

*The Ways of the Bay*, Billy Brennan, Billy B. Productions, PO BOX 5623, Takoma Park, MD 20913, (301) 622-1025

Songs for kids about bays and estuaries with ecological information and an environmental message.