



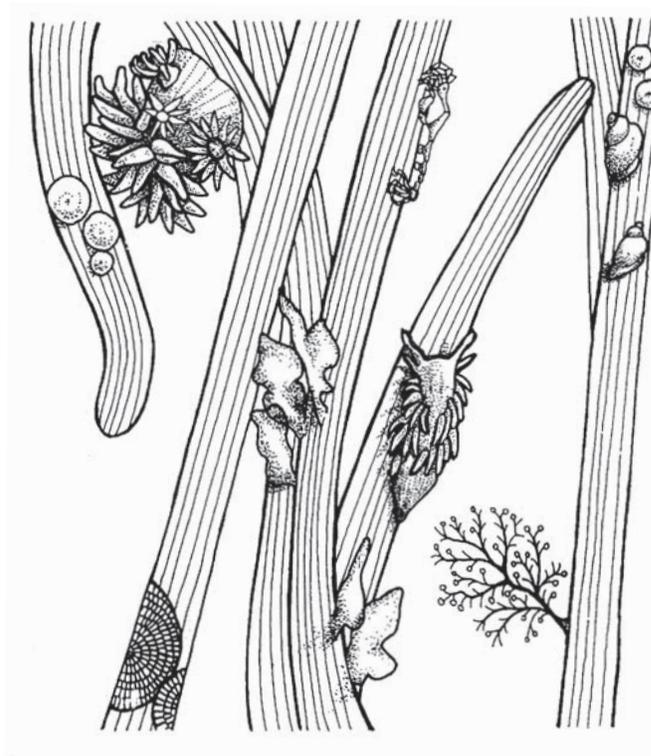
## Estuary Community Dance

It's a party, and all the plants and animals are invited. Like a community dance, this activity gives students a chance to get to know the members of an estuary community a little better.

Copy the cards on the following pages. Pin a card on each student's back and challenge the class to find out "who" they are. Students can mingle freely, asking only yes and no questions to gather information about the plant or animal on their back. When all the students have guessed correctly, mix the cards and repeat with new critters.

You may want to set the stage properly with snacks, music, lights, etc., to make the event festive.

This is an excellent activity to close your study of estuaries, or to follow up class presentations from the activity, Critter Creations, on page 37.





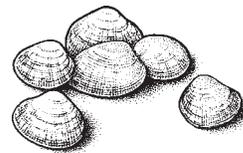
I'm proud to be a **GREAT BLUE HERON**. Just look at my graceful long neck, powerful pointed beak, and great legs! What could be better for hanging out in shallow water and catching fish? Estuaries are good places for me to find food, but I also like ponds, rivers, wetlands, ditches -- anywhere wet. You'll never catch me swimming. I'm strictly the wading type.



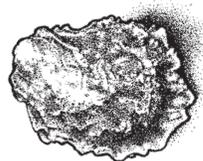
I'm the dead stuff, **DETRITUS**. I may not be a "critter" but I'm SO important, SO connected to everyone, and SO teeming with bacteria that I definitely belong at this party. I'm bursting with stored up energy. You can think of me as the corner grocery. My bacteria are munching away, unlocking goodies for everyone else to enjoy. I give the mud that beautiful color. My bacteria contribute to the lovely smell.



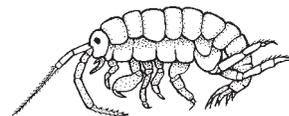
I'm a bent-nose **MACOMA CLAM**. Don't you think I'm well adapted to life in the mud flat? I'm thin enough to slip into the thick mud. My two siphons are just what I need to suck detritus off the mud surface and spit out the inedible particles. I'm a lovely mud-gray color so I'm hard to spot by hungry gulls. I don't have any eyes, so life down under doesn't bother me a bit.



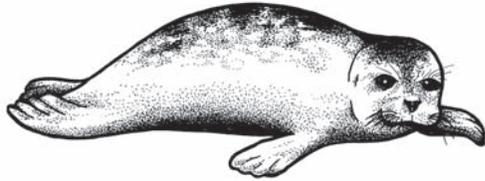
**LITTLENECK CLAM** means that I can't burrow very deep. My short neck has to be within reach of the mud's surface. I suck in the water through my siphon and filter out the plankton and detritus. Gulls really like me because they don't have to dig far to find me. People like me for the very same reason. When the tide is low, I just pull in my neck, close up tight, and wait for the water to return.



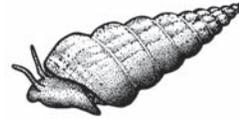
I'm an **OYSTER**, and I love estuaries. In fact, you won't find me anywhere else. In Washington, I'm a big money maker for shellfish growers. I have to have clean water, though or people can't eat me. Like clams and mussels, I filter plankton and detritus from the estuary water. In fact, I can filter 25 gallons of water each day. That's a lot for a little animal like me!



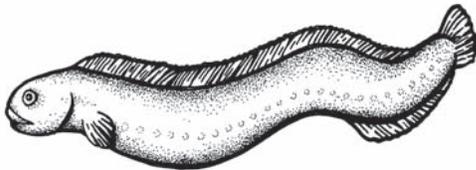
I am an **AMPHIPOD**. I am about the size of a house fly. I eat dead eelgrass which has washed up onto the shore, but other kinds of amphipods may eat things like smaller crustaceans (crab relatives), green algae, or diatoms (phytoplankton). I don't like fish such as salmon, perch, or herring, but they sure like me (to eat)!



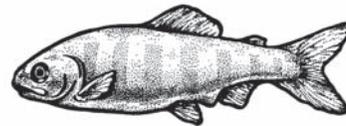
I'm a **HARBOR SEAL** and although my big eyes make me look "cute", I'm really a large predator with fierce teeth. I eat over twenty species of fish in Puget Sound with my favorites being sculpin, herring, and hake. You can tell me apart from other marine mammals by my small size, spots, and lack of external ears.



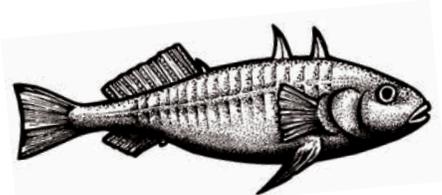
You can call me **MUD SNAIL**, although **BATILLARIA** is my true name. I'm a foreigner, imported from Japan, and I really love my new home. There's detritus everywhere for me to eat, and the mud is covered with microscopic plants called diatoms. Yum! I don't worry about drying out on sunny days. Even when the tide is low, the mud stays nice and wet, and I can always close my operculum if it gets too dry.



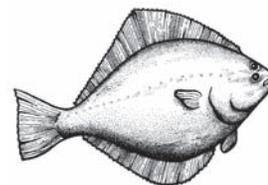
I'm a **GUNNEL**, one of several different species of gunnels found in Padilla Bay's eelgrass. Some people see my long, thin body, and think I'm an eel, but I'm not. Some gunnels can get to be a foot and a half long though 6"-10" is more common. I eat smaller animals like snails, clams, and little crabs.



I'm a young **SALMON SMOLT**. I'm one of thousands of migrating juvenile Chinook, coho, pink, and chum salmon that come down to the estuary from rivers and nearby creeks. I use the estuary as a place for my body to adjust to the salt in the ocean. And I chow down on copepods and amphipods (plankton) living on or near the bottom. Estuaries are good places to hide from big fish, too.



I'm a **THREESPINE STICKLEBACK**, and I hang around estuaries because I can handle both fresh and salt water. You might find me hiding in the eelgrass meadow eating smaller fish, tiny crustaceans, and plankton. If a predator threatens me, I'll stick up my sharp dorsal "spines." I especially need to watch out for bigger fish, seals, and birds.



I'm a **STARRY FLOUNDER**, hard to see when I lie flat on the mud. Like most fish, I'm born with an eye on each side of my head. After about 2 weeks, one eye begins to "migrate" to the opposite side of my head, and I lie down on the eyeless side. I skim along the mud flat eating crustaceans, worms and small fish. When I'm young, skeleton shrimp are my favorites to munch.



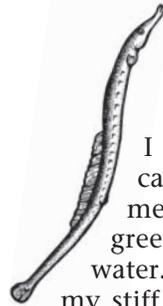
I'm a **HERMISSENDA**, a nudibranch. I must be the most beautiful animal here. I glide gracefully around the meadow with my cerrata (the frilly things sticking out of my back) rippling in the current. Those cerrata are my protection, for they contain stinging cells which taste bad to almost everyone. I like to eat eggs, little snails, other nudibranchs, bits of dead stuff -- most anything, in fact.



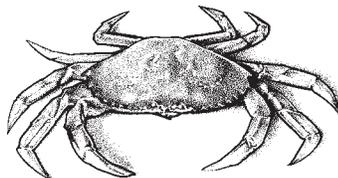
I am **EPIACTUS**, a brooding anemone. I attach myself to the blades of eelgrass where I sit and wait for plankton or detritus to touch my tentacles. I am green, like the eelgrass. I can move around, but I don't go far or fast. My babies attach to my side, so people call me a **brooding** anemone. I'm food for some nudibranchs (sea slugs) and sea stars.



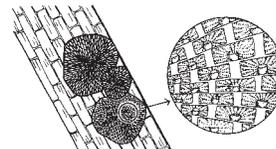
I am a **CAPRELLID AMPHIPOD**. People sometimes call me a skeleton shrimp, but I'm definitely not a shrimp. I inch my way along the eelgrass, scraping up diatoms, bacteria, and algae living on the blades. I'm prime fish food, so I hold tightly onto the eelgrass with my hooked "feet." I might win a prize for the most bizarre looking creature in the community.



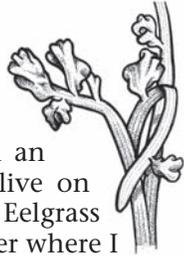
I am a **PIPEFISH**. I am perfectly camouflaged to live in the eelgrass meadow. I am long and thin and green, and swim vertically in the water. I eat plankton which I suck into my stiff mouth like a vacuum sucks up dirt. I need to watch out for larger fish and hungry crabs. My mother laid her eggs in my father's brooding pouch where I was incubated. I emerged looking like a tiny pipefish. I'm a year-round resident.



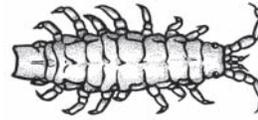
I am a small **DUNGENESS CRAB**, far too small for a crab pot. I grow pretty fast, but my skeleton is on the outside of my body so I have to molt my old shell, and grow a bigger one. The eelgrass offers me lots of hiding places, something important when diving ducks, great blue herons, and other crabs come around. My favorite foods are smaller crustaceans, clams, small fishes, and worms.



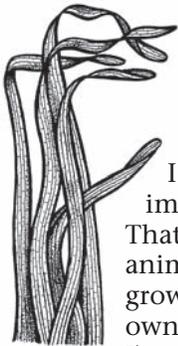
I am a **BRYOZOAN**. I live in a tiny box like case among thousands of other animals like me. My colony grows on algae or eelgrass to form a white, crusty patch the size of a quarter. I eat plankton which I catch with my tentacles. I'm not rare, I'm just small and hard to spot. Next time you go to the beach, check out algae and eelgrass that washes onto the beach, and you may find me.



I am an **ALGAE**, living on an eelgrass plant. (Plants that live on other plants are *epiphytes*.) Eelgrass holds me high up in the water where I can get the sunlight to make my own food. (That's photosynthesis!) I am food for animals like snails, amphipods, and sea slugs. If I grow too big, I may harm the eelgrass by blocking its sunlight. If my eelgrass gets eaten by a brant goose, I get eaten, too.



I am an **EELGRASS ISOPOD**, an eelgrass eater and a pretty good swimmer. I zip along from blade to blade, watching out for predators (fish). When I cling to an eelgrass blade, even the most observant fish (or human) can't see me unless I move around. I'm about an inch long and exactly the same width as a blade of eelgrass. When I was born, I rode around on my mother's back until I was big enough to take care of myself.



I am **EELGRASS**, the most important member of the bay! That's because lots of plants and animals live on or around me. I grow up to 10 feet tall, making my own food from the sun's light. Then I'm eaten by geese, ducks, isopods, snails, amphipods. . . I keep up by reproducing with both seeds and an underground stem that spreads and sends out new shoots.



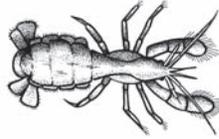
I am a **DIATOM**, a microscopic algae that can live floating in the water, coating the mud surface, or stuck to eelgrass blades. Much of the oxygen in the bay came from my photosynthesis. I reproduce by splitting in half -- pretty easy! If I get too thick on the eelgrass, I can harm my host by stealing all the sunlight. I'm eaten by lots of animals who scrape me off the blades (snails, sea slugs, skeleton shrimp).



I am a **HYDROID** that looks a bit like algae. Actually, I'm made up of lots of cooperating animals. Some of us hold on tightly to the eelgrass blade. Some of us transport food up and down the colony. Some of us are the hunters, catching plankton with stinging tentacles. Some of us produce the "baby" hydroid medusae which float around like jellyfish until they find a good place to settle down.



I am **LACUNA**, a very tiny snail that eats eelgrass and the algae attached to it. I am eaten by sea slugs and larger snails, but my hard shell keeps fish away. There is a tiny amphipod that tries to look and act like me so that fish will leave her alone, too. I lay my yellow eggs in donut-shaped rings on eelgrass blades. When danger is near, I close up tight and hope for the best.



I am the “excavator” of the mud flats, the **MUD SHRIMP**. I dig extensive burrows in the subtidal and intertidal mud which are then used by many other organisms. I'm about 3" long with a soft, bluish shell. I use my feathery pinchers to trap detritus loosened by leaflike “spinnerets” under my abdomen. Clams, worms, crabs, copepods and isopods may share my burrow.



I am **PHYLLAPLYSIA**, a beautiful, green sea slug. (Some people call me Taylor's sea slug.) I glide along the eelgrass, scraping up the layer of diatoms and other microscopic organisms that cover the eelgrass blades. I look like eelgrass, long and green with stripes that mimic the eelgrass ribs. I lay my eggs in a clear, rectangular patch right on the blades. It seems that I taste so bad that nobody else in this community is interested in eating me.



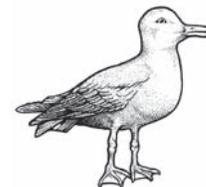
I'm a **LUGWORM**, a mud eater and burrower. I look a bit like an earthworm, but with little red gills sticking out along my sides. I eat the detritus in the mud and leave squiggly castings on the mud surface. Being a worm, I am food for birds and fish.



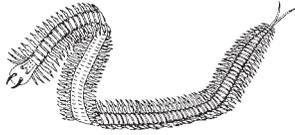
I am a **BLACK BRANT GOOSE**, a winter resident of the eelgrass meadow. I migrate between Mexico and Alaska, stopping at eelgrass meadows along the way to munch on those tasty eelgrass blades. Padilla Bay is one of my favorite stops because it has so much food for me. Some of my friends spend the whole winter here before travelling north for breeding season. I try to avoid humans and eagles.



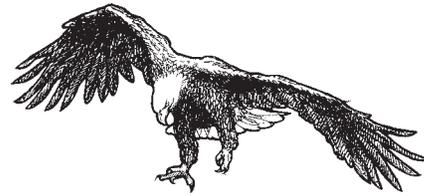
I am a **PERIWINKLE** or *Littorina*. Look for my small, black, round shell on rocks high in the tide zone. I prefer to be just out of the water, feeding on microscopic algae as well as bigger plants like sea lettuce. I can survive long periods out of water.



I am a **GULL**, the noisiest animal in the community. But I can't help it. I get so excited when the tide goes out and there is so much food to fight over. I eat crabs, worms, clams, fish, garbage -- just about everything! You may have seen my funny way of eating a clam. I fly up into the air and drop the clam, hoping to hit a rock. When the clam hits, its shell breaks and I have a feast.



Just call me **POLYCHAETE** (sounds almost like parakeet). I'm a lovely worm with lots of segments and leg-like things sticking out. You may find me digging around under rocks or in the mud, looking for food. Though my jaws look fearsome, they are mostly just for tearing algae. Birds like to eat me, so I try to stay hidden during the day.



I am a **BALD EAGLE**, the boss of all the birds. Not only do I look great with my white head and tail, I also soar well and have a good voice that you can hear all over. I'm known for eating salmon, but I also like estuary birds. I'm not too good at catching healthy ones, but if there is a sick or wounded duck or brant goose, I'll find it. Some days, I just sit in a tree and hang out.



A **BARNACLE** may be common, but it's not boring! I stay closed inside my shell when the tide is low, but you should see me when the tide is high! I stick out my feathery feet and wave them through the water to catch plankton. My biggest enemy is the seastar, so it's wise for a baby barnacle to attach to a rock high enough to be out of the seastar's reach but low enough to get enough food.



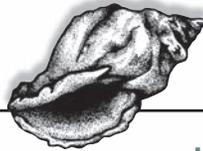
How would you like to be a **SPONGE** like me? I'm a colony of lots of little animals living together. I sometimes grow attached to eelgrass, oysters, or other shells. I pump water in through lots of tiny holes, filter out the plankton for food, and then pump it back out through bigger holes at the ends of my "arms." Sea slugs like to eat me.



I'm a **HERMIT CRAB**, the most amusing critter around. I ramble around the tidepools, looking for fights, scrounging for food, poking in and out of my snail shell home. Like all crabs, I shed my own shell when I grow, but I also have to replace my snail shell now and then when I outgrow it. I'm useful as a scavenger, eating bits of plant and animal material and keeping the beach tidy.



I'm a half pint in the seastar world, a **SIX-RAYED STAR**. I only get to be about 2 or 3 inches across, so I'm easy to miss. I eat slow animals like snails, mussels, barnacles, and limpets. I'm greenish-grey, so I blend into the eelgrass and mud very well.

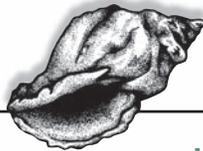


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## Is Dead Seaweed Garbage?

***Follow these directions to find the answer...***

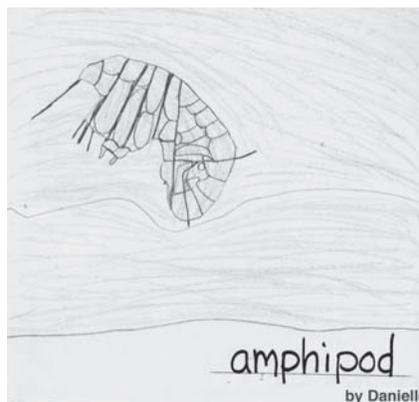
1. A piece of dead sugar kelp seaweed gets washed up on shore. Is it garbage?  
 Yes. Go to #12.  
 No. Go to #9.
2. Wrong. Nutrients in the soil are used by plants.  
 Now go to #11.
3. Right! Snails, worms, seagulls and other animals often eat dead things. Are there animals which eat live creatures?  
 Yes. Go to #8.  
 No. Go to #6.
4. Wrong. A rotting animal is food and a home for the living things which decompose it.  
 Now go to #5.
5. Right. When bacteria and fungi “rot” things, they return them to the soil. The nutrients from their bodies become part of the soil. So this is where nature’s garbage ends up finally, right?  
 Yes. Go to #2.  
 No. Go to #11.
6. Wrong. Animals like seals and great blue herons, for example, eat other animals.  
 Now go to #8.
7. Wrong. Dead things in nature are never wasted. We call dead stuff *detritus*, and *detritus* is full of nutrients that can be reused again and again.  
 Now go to #3.
8. Right! These animals are called predators. If an eagle eats a salmon and then flies away and dies and rots, is it garbage?  
 Yes. Go to #4.  
 No. Go to #5.



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## Is Dead Seaweed Garbage?

9. Right! Dead seaweed is alive with critters that eat it. Amphipods (or Beach Hoppers) are one example. What happens when these animals die? Are they garbage?
- \_\_ Yes. Go to #10.  
\_\_ No. Go to #13.
10. Wrong. There are so many amphipods that if no one ate them and decomposed their bodies, the beaches would be buried in their bodies!
- \_\_ Now go to #13.
11. Right! Plants on the land will use these nutrients to grow. The rain will wash some of these nutrients back down to the estuary where they will nourish new seaweed to replace what died. And that brings us back to where we started . . . at #1. There is no garbage in nature, because everything is reused again and again in a circle.
12. Wrong. Dead seaweed is not worthless.
- \_\_ Now go to #9.
13. Right! Dead and living amphipods are food for birds like sandpipers. If a sandpiper eats an amphipod, but then the sandpiper dies, will its body be of any use?
- \_\_ Yes. Go to #3.  
\_\_ No. Go to #7.





## From Marsh to Marina

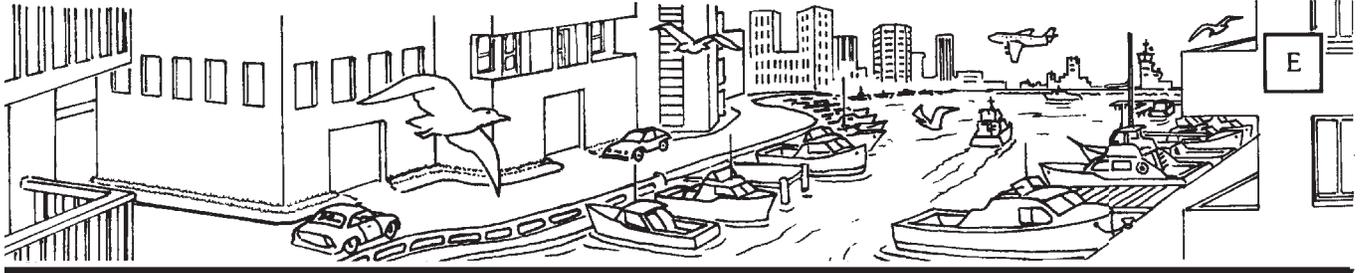
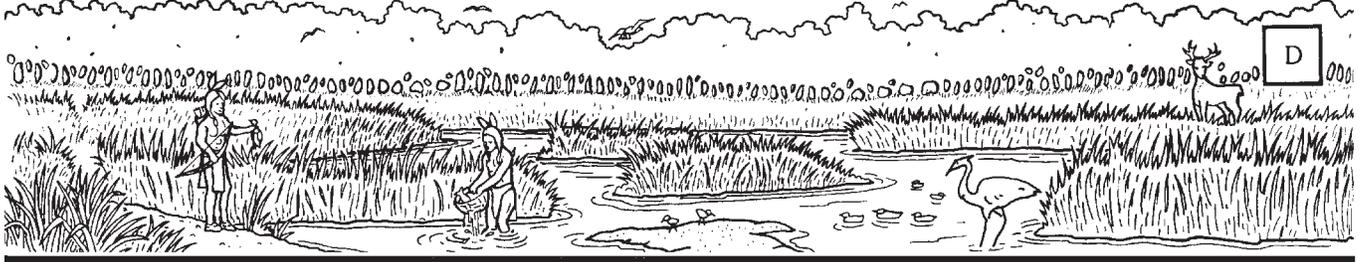
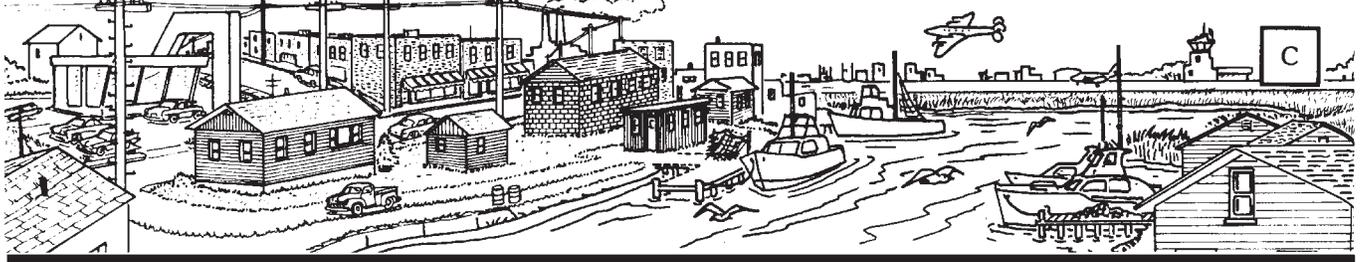
**Estuaries** and **Salt Marshes** can be great places to make a living. Native Americans living along the coasts knew this — and so did some of the earliest settlers. Try this activity to get your students thinking about how people have used (and abused) these wetlands over the years.

Begin by passing out the Marsh to Marina pictures on the next page. Explain that the pictures represent some of the ways people have used wetlands through time. Have the students cut out the pictures and then try to arrange them in order.

When everyone's finished, go over the answers. Then have each glue the pictures in the correct order on a large sheet of construction paper. (You might want to have the kids color the pictures). Have them label the time period of each picture as follows:

Picture D	before 1800
Picture B	mid 1800s
Picture F	late 1800s
Picture A	early 1900s
Picture C	1950s
Picture E	1990s

Afterward, hand out the information on page 60 to discuss each picture.





## From Marsh To Marina

**Picture 1:** Native Americans were the first people to use the resources of salt marshes. Around the Skagit Valley the Salish people hunted and fished in salt marshes and estuaries. They found plenty of game in these wetlands — especially when huge flocks of ducks and geese passed through during migration. People gathered oysters, clams, and other shellfish in tidal creeks and mud flats. They built fish traps out of saplings and scooped the trapped salmon into cedar baskets.

**Pictures 2 & 3:** The first European settlers made their homes on the estuary shore during the 1800s. Living near the marsh wasn't an easy life. For one thing, clearing trees and stumps was hard work. Making the marshes into farmland meant building dikes and drainage ditches by hand with shovels and wheelbarrows. But there were advantages to the estuary, too. There was plenty of food, rich soil, and settlers used the waterways for transportation.

**Picture 4:** By the early 1900s, many estuaries in the Northwest had been settled. In some areas people began to have a big impact on the ecology of the land. Compare this picture with the first three pictures. Before there were so many people, the estuary could easily recover from the impact people had on it. But as the population grew, more serious and long-lasting changes were made.

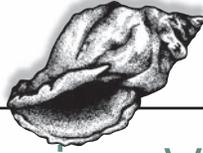
**Picture 5:** By the 1950s, people had drastically changed many of the original estuaries. Many were filled in for houses, industries, and roads. Others were dredged for ships and marinas. Because there were no regulations protecting the water, pollution from towns and industries was a problem.

**Picture 6:** By the 1980s and 1990s, people passed laws protecting the water from pollution from factories and cities. Now one of the biggest threats to water quality is runoff from roads, farms, and neighborhoods. More people means more developed areas, more roads, and more houses. Animals like salmon have lost much of the estuary habitat they depend on.

### **Discuss:**

List the ways people used the estuary. Describe a shoreline you know that may have been changed in this way. How did the way people value the estuary change over time? How are estuaries valuable to us today? Research your own estuary and create your own timeline.

*This activity comes from Ranger Rick's NATURESCOPE, a National Wildlife Federation publication, Volume 2, Number 5, "Wading into Wetlands".*

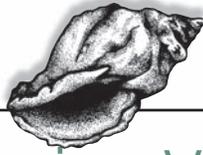


## Changing Values

***Read the following articles that show changing values of estuaries. Individually or as a class, answer these questions.***

1. Look up the word "value" in the dictionary. Which definitions apply to the phrase "changing values of estuaries?"
2. What does each writer think estuaries or wetlands are good for? (How are they valuable?) Find words or phrases in each article that show the writer's attitude or values.
3. The 1961 editorial compares the developers who proposed an industrial site in Padilla Bay to the settlers who diked and drained the Skagit River estuary to create farmland. How were their values the same? How does the writer feel about people who were against the proposal?
4. In the 1989 editorial, the writer quotes President Bush as promising that no wetlands would be lost during his administration. The US Fish and Wildlife Service reports that 117,000 acres of wetlands were lost each year during that time. Discuss how that might have happened.
5. Think about this quote from the 1999 article from the Seattle Times. "We are going to be challenging an entire state about the way it behaves, and that's never been done before." What behavior do you think the speaker is referring to? How might that behavior be challenged?
6. Imagine how values might change in the next 15 years. Write the headline for an article about salmon, estuaries, or wetlands that may be published 15 years from now. (Or—write the whole article!)

Bonus - Collect newspaper articles about a current issue affecting your estuary.



## Changing Values

Excerpts from an editorial in the Puget Sound Mail, La Conner, Washington. Thursday, November 23, 1961.

### **Proposed Padilla Bay Industrial Site Project Is Most Dynamic Reclamation Enterprise Since the Pioneers Diked and Drained the Skagit Delta Marshes**

The proposed Padilla Bay industrial site project, in our opinion is the most dynamic reclamation proposal since the days when the far-sighted and industrious pioneers diked and drained the marshes of the Skagit Delta to develop some of the finest farm lands in the nation. No doubt in pioneer times there were some who were against change and who thought it would be foolish to try and create farms out of the swampy wilderness and who felt the farms would ruin their hunting and trapping. But among the pioneers were "builders" of vision who strode forward to create. As the August edition of the Puget Sound Mail noted, it was a time when "Tall Men with tall ideas came to the Tall Tree country of the Skagit."

Even today there are some who are against change or betterment: some who "have it made" . . . But change and betterment will, and must come.

Here in Skagit County we have power, a great fresh water potential, and deep water near at hand - things of great importance to industry which can provide those needed year-around jobs. And this proposed reclamation of several thousand acres of tidelands for industrial site purposes would also help keep secure our valuable farmlands. In many states rich farmland has gone to industrial sites. In the

Padilla Bay Project something new will be created instead of whittling away at the farmland...

This Padilla Bay Project could be one of the best such proposals in the state, or for that matter on the west coast. Opportunity is knocking at Skagit County's door and should not be ignored. We need more year around industrial employment to balance our economy—but we'll not get it without working for it . . .

Padilla Bay, in Skagit County near Anacortes, offers the most favorable site for such an industrial development for the following reasons:

1. The bay is protected from storms by the surrounding islands.
2. Highway, railroad, power, water, natural gas and crude oil lines all pass close by the southern end of Padilla Bay.
3. Padilla Bay is an extinct delta of the Skagit River. This is a great advantage as the lands are completely stable with no active river to bring silts and form shoals in the dredged channels.

As one government man is reported to have stated when first viewing the proposed development: "Of all the proposed industrial areas in the U.S., this takes nothing from anything else—it creates something new, from tidelands."



## Changing Values

An editorial from the Anacortes American, Anacortes, Washington.  
Wednesday, July 26, 1989.

### **Bush, Rest of Nation Discover Wetlands are Worth Saving**

They used to be considered useless land, suitable only for man to drain, fill and exploit.

We now call them wetlands, and a lot of people—from President Bush on down—think they must be saved. Bush has promised that not a single wetland will be lost during his administration. What a change from Ronald Reagan, who did not consider preservation of the environment to be a pressing matter.

Wetlands are saturated soil formations—bogs, swamps, marshes and the like. Man has been destroying them at an alarming rate. In a lengthy essay on the environment published this week, *Newsweek* magazine reported that about 500,000 acres of wetlands a year have been filled. A prominent regional example is the Snohomish River delta between Everett and Marysville, which has been filled in over the years for farms, sawmills and a freeway.

Why did this happen? Because previous generations believed wetlands were no big deal. And as far as visual appeal is concerned they still pale in comparison to virgin forests and wilderness areas. But as *Newsweek* points out, they are ecologically more significant than the national parks and wildlife preserves that attract far more attention.

In fact, *Newsweek* lists saving the wetlands as one of five key environ-

mental issues for the 1990s.

Folks on Fidalgo Island knew about the importance of wetlands long before *Newsweek* gave big play to the subject. The Evergreen Islands environmental-activist group has been taking a close look at wetlands in and around Anacortes. Local Audubon Society members are gearing up for an ambitious survey of all wetlands in Skagit County.

Why are wetlands important? Why should you care about an unattractive swamp? Because wetlands are prolific breeders of life ranging from the mundane (snails) to the spectacular (bald eagles). When we fill in and pave over a wetland, we snuff out a frighteningly wide range of life forms.

As *Newsweek* noted, wetlands have another important characteristic: they act as natural filters for removing pollutants from water. Man-made wetlands have been used to treat municipal sewage, and a citizens' group is lobbying for the wetlands-sewage approach instead of an expensive, federally mandated secondary sewer-treatment plant here. They're on to a good idea, but there's no hard evidence yet on whether their proposal would suit Anacortes. What's more, the city may not be able to escape from terms of the federal mandate, if town officials choose to do so.

The tools are in place to protect natural wetlands from develop-



## Changing Values

ment, although the Environmental Protection Agency can and does make exceptions to the rules. It remains to be seen whether Bush's

promise can be kept.

But at least our leaders now are talking about saving wetlands, not just about filling in swamps.

An excerpt from the *Seattle Times*, Seattle, Washington, March 14, 1999

### **Puget Sound Salmon on the Brink**

Like it or not, the region is about to embark on a great debate about what the Northwest is to become. The Endangered Species Act listing of salmon will force us to choose between more for us and more for the fish.

"We've begun a historic debate, unlike anywhere else in the country, about the future of the region and its quality of life and natural resources," said Curt Smitch, the governor's special assistant for natural resources. "We are going to be challenging an entire state about the way it behaves, and that's never been done before. We don't know what the public is going to say.

"Maybe they don't want salmon. It's a fundamental policy debate based on values."

Some already think environmental regulations go too far. "We've lost all common sense," said Tom McCabe of the Building Industry Association in Olympia. "The salmon are being used to stop growth. We have a history in Washington of putting animals and trees ahead of people."

Exactly what it will take to bring back robust, fishable runs of wild

Puget Sound chinook, the largest and most prized salmon, is far from clear.

Chinook have been in decline for decades. A generation of politicians and fish managers have made careers of salmon recovery.

Now, recovery of chinook in the Sound, if it occurs, will be a slow process of undoing the thinking, actions and investment that got us into this fix. According to fish managers:

A no-net-loss policy will be in effect with regard to salmon habitat. That means destroying fish habitat anywhere without making up for it will not be allowed.

Instead of building more dikes and jamming rivers into engineered, concrete channels, rivers will have to be reintroduced to their old flood plains, side channels and sloughs.

Fish need the quiet resting and feeding places that pools, meandering streams and side channels create. A straight, engineered chute of a river that rages during winter floods is a surefire salmon-killer.

Some dikes will have to come out. Some flood plains will have to be



## Changing Values

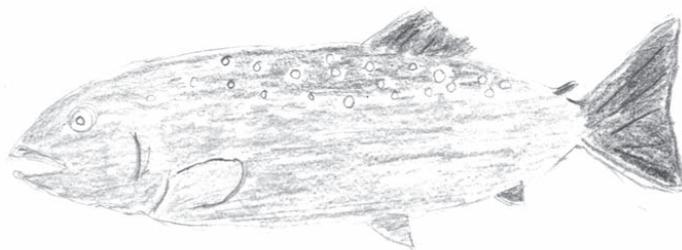
bought up and put in conservation so rivers can reclaim them. The natural volume of water will need to be restored in rivers where it has been sucked low for use by people.

"We have met the enemy and it is us," says Mike Schiewe, director of fish ecology at the federal fishery service's science center in Seattle.

We've logged the headwaters and banks of our rivers. Diked, dammed and channeled their flow. Drained, filled, and built on their flood plains. Polluted and developed their estuaries.

More than any single heroic rescue, restoring healthy runs of Puget Sound chinook will require a new philosophy toward the landscapes both we and these fish call home, said Bruce Sanford, who coordinates chinook programs for the state Department of Fish and Wildlife.

"It's about our priorities. Are salmon going to be part of our values, or aren't they?" Sanford asked. "Society needs to make a choice. We are trying to have it all and we can't."



salmon

by Daniel Van Norman

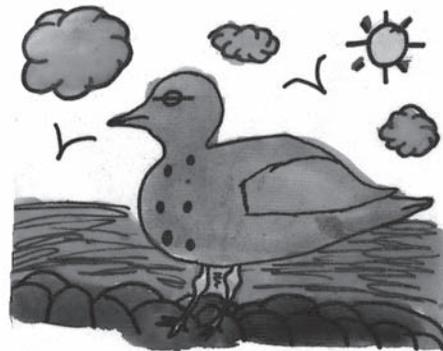


## Making Good Decisions

***This activity helps students examine connections between their own decisions or behaviors and the health of their estuary. Students create advertisements supporting thoughtful decisions in their watershed.***

Individuals make decisions every day which may affect the health of their estuary. Some of the decisions are big, perhaps made by elected officials or government employees—decisions like how much discharge a city sewage treatment plant can release into the water. Most of the decisions, however, are small and personal—how we use water, how we care for our lawns, how much we drive our cars, or how we behave at the beach. Though the impact they have on the estuary may be small, our actions combine with the actions of thousands of other people to add up to something very significant.

1. As a class, brainstorm decisions students make that affect estuaries. Stress personal actions and choices, rather than group or societal choices. List the choices on the chalkboard, and discuss how they affect estuaries.
2. Divide the students into groups of three to five, and assign each group one decision from the list. Give them the task of "spreading the word" about their action. Students can make an advertising poster, TV commercial, radio announcement, etc., aimed at convincing others to make wise decisions. Use your imagination here—this can be a simple half hour task or a full blown multimedia production. Share your productions with the rest of the school—on a bulletin board in the hall, at an assembly, with fliers to take home, etc.



**Sandpipers**

by Jessie

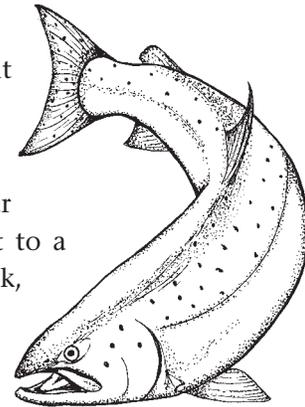


## Watershed Salmbassador

*Use a stuffed salmon and a travel log to connect the schools in your watershed.*

Salmon can't read street signs or find a school, but when they return from the ocean, they find their way back to the place they were born. By sending a salmon ambassador around your watershed, you and your students can share what you're doing to protect clean water and salmon, *and* learn how other schools in your watershed are doing the same.

1. Buy or make a stuffed salmon. Students can make one of fabric and fabric paints or of paper.
2. Name your salmon and create a travel log to document the trip. (See page 69 for ideas.)
3. Get a map of your watershed from the county or city and make a list of schools in your watershed. If your watershed is too large, consider limiting your project to a smaller area—perhaps the watershed of a stream or creek, or include only a sample of schools.
4. Mail a letter with your plan to all the schools that you hope to involve. (See sample on page 68.)
5. Send the salmon and travel log to the school at the bottom of the watershed (closest to the estuary) with instructions for using the travel log and sending it to the next school.
6. Set a timeline to insure your salmon returns before the school year is over. Include postcards addressed to your school to monitor the salmon's progress. (See sample on page 72.)
7. **Ask each school to pledge to help the salmon make it upstream by changing their own behaviors at home and at school.** (See *50 Simple Things Kids Can Do to Save the Earth* in reference section.)
8. When your salmbassador returns, celebrate with a Salmon Homecoming party. Share with the rest of the school.



On the following pages, you will find a sample letter to participating teachers, ideas for a travel log, a log template you may copy, and post cards for schools to mail back to you. Allow your students to create as many of the materials as possible.



## Sample Salmbassador Letter

Dear Mr. Smith,

Our fifth grade class is tracking a salmon migrating through our \_\_\_\_ River watershed. The stuffed salmon, Sal, will be arriving at your school sometime around \_\_\_\_.

When she arrives, please follow the instructions for moving her along the way. As a class, please help the salmon fill in a section of the journal for your area of the watershed, If you'd like to include a picture of your class or artwork, that would be great!

We'd especially like to know what people are doing all over the watershed to protect salmon and their habitat. The pledge card is a chance for you to help out and to let us know what you are doing. Even a small promise like using less paper in your class or conserving water makes a difference.

When you've added to the journal, please send us a postcard (included in the package) so we know where our salmon is travelling. Then send the salmon on to the next school on the list. We want our salmon to make it the whole way up the watershed from the estuary to the spawning grounds before school is out in June.

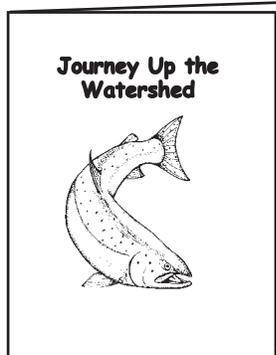
If there is no way your class can participate, please find another class in your school who can, or call us with questions. (Include phone number and address.)

Sincerely,

Ms. Jones' 5th grade class.



# Salmbassador Travel Log Ideas



Your salmon's travel log will be a detailed record of what students are doing for salmon. Use the masters on the following pages, or customize your own. (Copy page 71 on both front and back for multiple pages—one for each school on your list.)

Here are some ideas for things to include in the log. You can choose those that will work for your class and watershed.

**On the cover** – Name your salmon; include a picture; make it a passport; use heavy paper or poster board; laminate it.

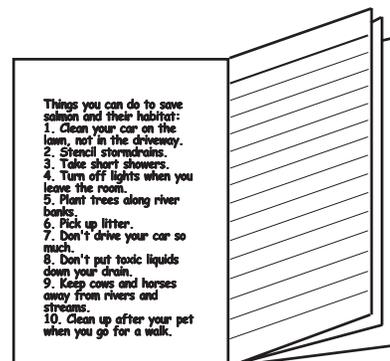
**Inside the cover** (front or back) – Include a map of the watershed or river. Ask schools to place their school on the map. Include a list of schools with their addresses, in their order in the watershed. Give information about the kinds of salmon using your river or stream and when they migrate.

Make a list of personal behaviors that help salmon and their habitat. (Conserve water. Conserve paper. Don't let toxic things like motor oil or paint thinner get down the drain or in the ditch. Plant trees along streams and rivers. Clean up after your pet. Pick up litter, carpool, take the bus, ride your bike, turn down your thermostat, and conserve electricity, etc.)

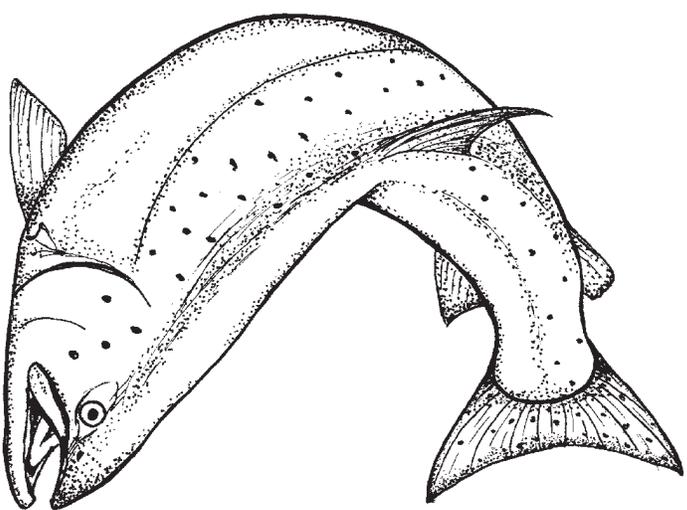
**Entry pages** – Leave room for artwork, make a place for photos, ask questions about participating schools, ask each school to add a piece of information about local salmon and their needs, make lined pages for a "notebook" look.

Include enough pages for all the schools to make entries. Don't forget to include your name and phone number in case teachers have questions.

**Individual Journals** – Make journals for each student in your class for observations, art, poetry, stories, etc.



# **Journey Up the Watershed**



We pledge to help salmon make it  
through our watershed.  
This is what we will do:

I arrived at \_\_\_\_\_ school on \_\_\_\_\_

The water from the school parking lot goes to  
this stream or river:

The river or stream near here looks like:

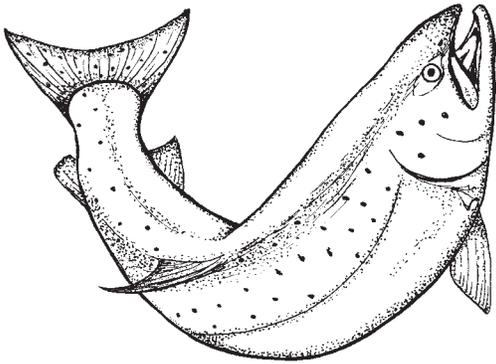
The land around the stream or river looks like:

72

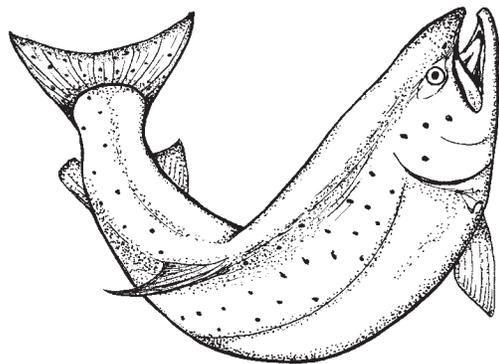
These kinds of salmon use the stream or river:

These are things people are doing to make my  
habitat better:

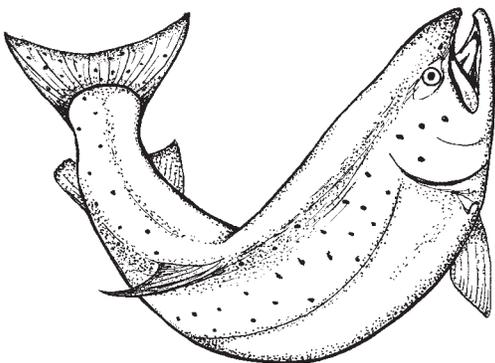
**I'm on my  
Way!**



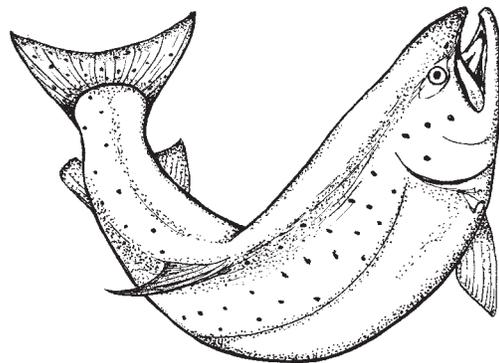
**I'm on my  
Way!**

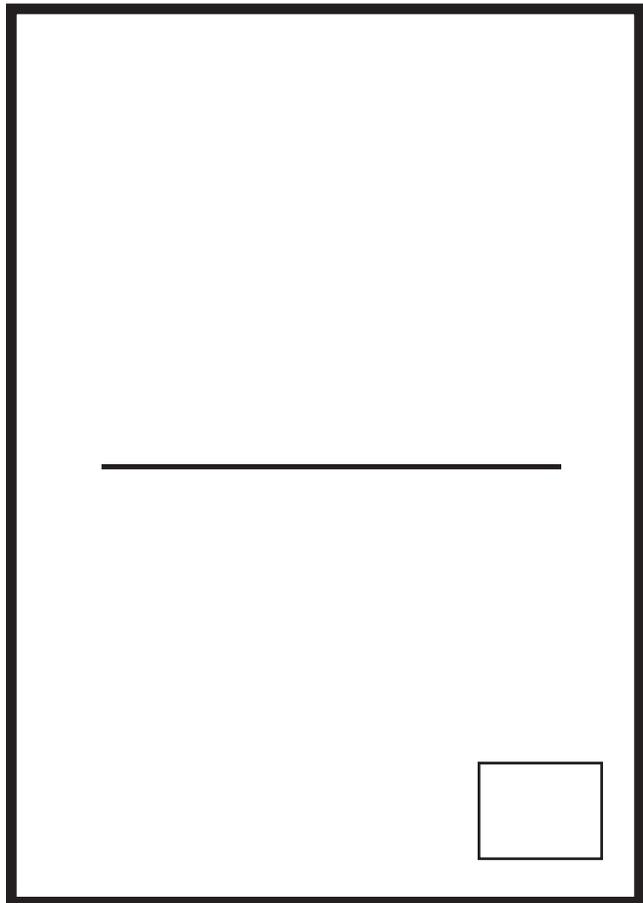
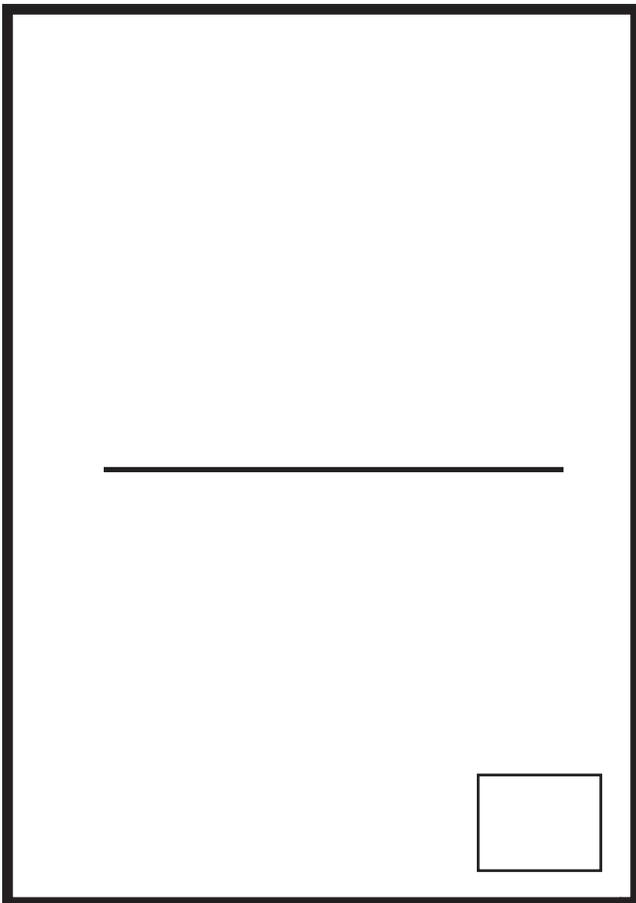
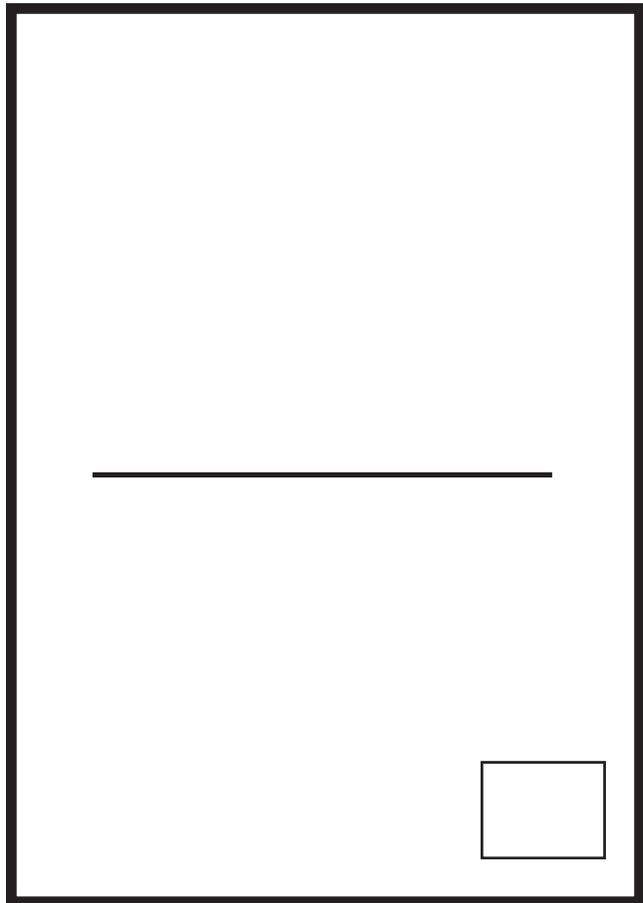
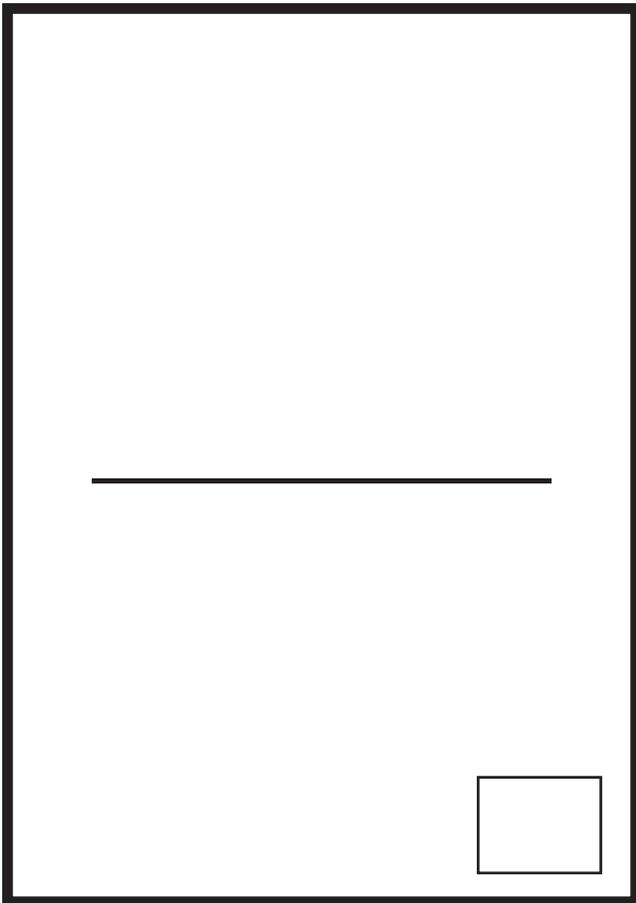


**I'm on my  
Way!**



**I'm on my  
Way!**







## Drawing Your Own Water

### ***Research and draw your place in the water cycle.***

You've probably learned about the water cycle. Water evaporates from the ocean. Clouds form. Rain falls . . . But did you ever think of yourself as a part of that cycle?

Think about the water that goes through **your** house. Where does it come from? Where does it go? Do you live near a river or stream? Do trees in your yard take water from the soil and evaporate it through their leaves?

Research your water cycle. Find out exactly where your water comes from (a well? a water treatment plant?). If it comes from a river, where does the river start? Where does it end up after it goes down the drain? Does it end up in an estuary?

Using this information, draw a picture of **your** water cycle. From this list, use any labels that apply to your water:

condensation	drain pipe
evaporation	septic tank
lake	drain field
stream (name?)	ground water
river (name?)	wetland
estuary	well
ocean (name?)	cloud
water tower	sewer pipe
evapotranspiration	your home
water treatment plant	tree
sewage treatment plant	
wastewater outfall	

1. Make a list of things that might go down the drain with the water at your house or school.
2. Choose 2 items from your list. Call 1-800-RECYCLE and find out if those are OK to have in the water cycle. Can they be cleaned up at the sewage treatment plant or in a septic tank? If they are harmful to the environment, are there safer alternatives?



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# Getting Serious About Cars

***Think about how cars contribute to water pollution, and survey your school vehicle use.***

Cars! What could be more important to us? You may have heard that automobiles are the largest source of air pollution in Washington, but have you ever thought of cars as water polluters, too?

What goes up usually comes down. Invisibly, air pollution clings to water in the clouds and comes down as polluted rain. A car's tires wear on the road and leave cadmium and zinc to be picked up by the next rain. A parked car drips oil and grease. Chromium and zinc wear off the body. Copper and lead come from the engine. Once on the driveway or road, this ends up in ditches, storm sewers, and eventually the estuary. As much as we might hate to admit it, driving less is good for the estuary.

Here are four short surveys which look at how we get around. You may want to divide into four small groups and do one survey each.

## **1. The Buses**

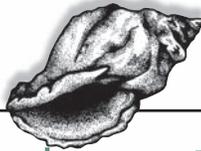
Interview bus drivers. Ask them the number of miles they drive each day for your school. Find out their gas mileage and the average number of students per trip.

Calculate the total amount of gas used by buses to bring students to your school each day. Calculate the amount of gas used per student per day.

## **2. Parent Drivers**

Count the number of students who get a ride to or from school from a parent or friend. (You may need to plan a "stake out" where students are dropped off, getting adult help for safety.) Find out: how far they drive, how many students ride in each car, what the gas mileage is, and why they didn't use the bus.

Calculate the total amount of gas used by students who get a ride to school. Calculate the amount of gas per student per day.



## Getting Serious About Cars

### 3. The Faculty Parking Lot

Design a survey to find out what percentage of teachers drive to school. In your interview, find out if public transportation is available. If available, why don't the teachers take the bus? Ask if they ever car pool and why. Find out how many miles they commute daily. What is their gas mileage? Calculate how much gas is used per teacher per day driving to school. Calculate the total amount of gas used by teachers each day.

### 4. The Pavement

Estimate the percentage of your school property that is paved for vehicles.

Go outside and find a storm drain or ditch that catches runoff from the parking lot. (This is easy if it's raining.) Make a note of any visible pollutants on the pavement or in the water. Where does the water go from there? If you need to ask your local public works department for information, designate one person to call.

### **Sharing your results with the rest of the class, work together to answer these questions.**

1. Why do some teachers and students choose not to use the bus? What difference would it make if they did?
2. How much space in your community is set aside for the care and use of cars? (Consider driveways, garages, streets, gas stations, freeways, malls. Look in the yellow pages in the automobile section for more ideas.) How does this compare to the amount of space set aside for people to live, play?
3. Does the runoff from your school parking lot go directly to a body of water, or is it treated first? If it goes to a sewage treatment plant, are toxins removed from the water there?
4. List 10 advantages and 10 disadvantages for driving a car. Rank them. When do **you** choose to not use a car?



## Perusing the Poisons

***Check your homes for common toxic substances and learn about their proper disposal and safer alternatives.***

Many useful products around our homes are hazardous to people, animals and the environment. If we pour these products down the drain, in a ditch, or in the backyard, there is no doubt they will contact living organisms. Eventually they may drain into a wetland, the groundwater, or an estuary where they can cause trouble.

You **must** ask a parent or adult to assist you with this inventory! Hunt around your house, basement, and garage to find out which of these products you have. Note whether it will be used again. Think of ways it might get into the water. Then check the labels. "Caution," "Warning," and "Danger" all mean the product is toxic, with caution being least harmful and danger being most harmful.

**Caution:** Please be very careful handling these products. While not all household products are hazardous, many could be harmful. Do not open any containers, and wash your hands carefully after handling.

With your class, discuss ways to properly dispose of toxic substances. If you have questions, call 1-800-RECYCLE to find out what to do with toxic waste from your home.

Do you have?	Will it be used?	How could it get into water?	Caution, Warning, or Danger	Safer Alternative
<b>PAINTS</b>				
<input type="checkbox"/> Enamel or oil based paints				
<input type="checkbox"/> Latex or water based paints				
<input type="checkbox"/> Rust paint				
<input type="checkbox"/> Thinners and turpentine				
<input type="checkbox"/> Furniture stripper				
<input type="checkbox"/> Stain or finish				



## Perusing The Poisons

### Household products inventory

Do you have?	Will it be used?	How could it get into water?	Caution, Warning, or Danger	Safer Alternative
<b>HOUSE</b>				
___Oven cleaner				
___Drain cleaner				
___ Toilet cleaner				
___Disinfectants				
___Upholstery or rug cleaners				
___Furniture or floor cleaners				
___Cleaners with bleach				
___Photographic chemicals				
___Silver polish				
___Pool chemicals				
___Cleaners with ammonia				
___Spot removers				
___Abrasive cleaners				



# Perusing The Poisons

## Household products inventory

Do you have?	Will it be used?	How could it get into water?	Caution, Warning, or Danger	Safer Alternative
<b>AUTO</b>				
<input type="checkbox"/> Antifreeze				
<input type="checkbox"/> Used oil				
<input type="checkbox"/> Brake fluid				
<input type="checkbox"/> Transmission fluid				
<input type="checkbox"/> Batteries				
<input type="checkbox"/> Gasoline				
<b>PESTICIDES</b>				
<input type="checkbox"/> Herbicides				
<input type="checkbox"/> Mouse and rat killer				
<input type="checkbox"/> Roach and ant killer				
<input type="checkbox"/> Flea collars and sprays				
<input type="checkbox"/> Insecticides				
<input type="checkbox"/> Fungicides				
<input type="checkbox"/> Slug bait				
<input type="checkbox"/> Mothballs				
<b>OTHER</b>				
<input type="checkbox"/>				



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## Perusing the Poisons

### Potentially Hazardous Household Products - Some Safer Subs

<b>For this product</b>	<b>Try this safer substitute</b>
Air freshener _____	Cinnamon & cloves (simmered)
Bathtub and tile cleaner _____	Baking soda & vinegar & water
Burn mark remover _____	Grated onion
Coffee cup stain cleaner _____	Salt (moist)
Decal remover _____	Vinegar (soak in white vinegar)
Drain cleaner _____	Plunger; baking soda or vinegar & hot water
Furniture polish _____	Olive oil; lemon juice & mineral oil
General household cleaner _____	Baking soda
Hand cleaner for paint/grease _____	Baby oil
Ink spot remover _____	Cream of tartar & lemon juice & cold water
Insects on plants _____	Soap & water
Moth repellent _____	Proper storage & laundering of clothing
Oil based paint _____	Water based paint
Oil stain remover _____	White chalk (rubbed in before laundering)
Paint brush softener _____	Vinegar (hot)
Refrigerator deodorizer _____	Baking soda
Roach repellent _____	Roach trap or "hotel"
Rug cleaner _____	Club soda
Rust remover _____	Lemon juice & salt & sunlight
Shoe polish _____	Banana peel
Slug repellent _____	Diatomaceous earth, copper flashing
Spot remover _____	Club soda; lemon juice; salt
Water mark remover _____	Toothpaste
Window cleaner _____	Vinegar (in warm water)
Wine stain remover _____	Salt

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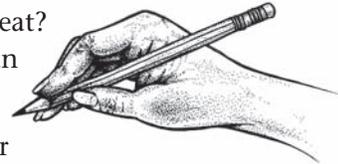
Adapted from *Away with Waste*  
Washington State Department of Ecology Publication #98-200, 1998.



## More Ideas

### Language Arts

- Describe a day in the life of a young salmon who has journeyed downstream to the estuary. What kinds of plants and animals do you see? Where do you like to hide? What do you eat? What are you afraid of? How is life different here than it was upriver? What will it be like in the ocean?
- Write a letter to the Padilla Bay educators about your field trip. Include information about what you learned there and actions you could take to keep your own estuary healthy.
- Write poetry, haiku, or other forms of expression on an estuary theme.
- Make up riddles or limericks about estuaries or estuary animals. Have others guess your subject.
- For each letter in ESTUARY, have the children write a word or phrase describing an estuary.
- Play password with the new estuary vocabulary words.



### Social Studies

- Research the role of salmon in Pacific NW culture over the last 250 years.
- Describe the life of a Native American child living by Padilla Bay 200 years ago.
- As an early explorer, write a letter back to Europe explaining why Padilla Bay would or would not be a good place to settle.
- Interview older local folks for memories of "before."
- Write laws relating to the use and protection of estuaries and vote on them.
- Invite your local or state representative to speak to your class on an issue affecting your estuary.
- Look at maps of the country and world. Locate major rivers and their estuaries. How many cities can you find that are built on estuaries? Prepare individual reports on different estuaries around the world.
- Set up a debate between two groups with opposing viewpoints on a local land use issue.



## More Ideas

### Math

- Estimate the number of plankton in Padilla Bay. Count the number of plankton in a small sample of water from the bay. Then, estimate the volume of water in the bay. (The average depth of Padilla Bay at high tide is 8 feet and the bay covers about 6,630 hectares.)

### Science

- Learn the taxonomic classification system for marine organisms.
- Make and use a dichotomous key for shells.
- Write a research proposal about one specific thing you'd like to know more about from your trip to Padilla Bay. Include a research question, hypothesis, proposed methods. Be sure to consider logistics (cost, materials, time, tides, etc.).

### Creative Dramatics

- Play charades. Act out how animals move and eat.
- Demonstrate a “food chain in action” as a group effort (seastar eating a clam, heron spearing a fish, a large anemone filter feeding, etc.).
- Tell a story about the estuary without words.
- Have one student be the sun and ask each in turn to add a link to the food chain.

### Creative Thinking

- Design mud shoes. (Think of snow shoes.)
- Study why animals become endangered and what, if anything, we should do about it.
- Create a mythical estuary in another world. Use what you know about your estuary, and transfer that to your new world. Think about how energy moves through food chains. (Who are your producers or carnivores?) Are there tides? (What if your world has 4 moons?) How are organisms specially adapted to your environment? What great interconnections can you think up? Are there people near your estuary?



## More Ideas

### Art

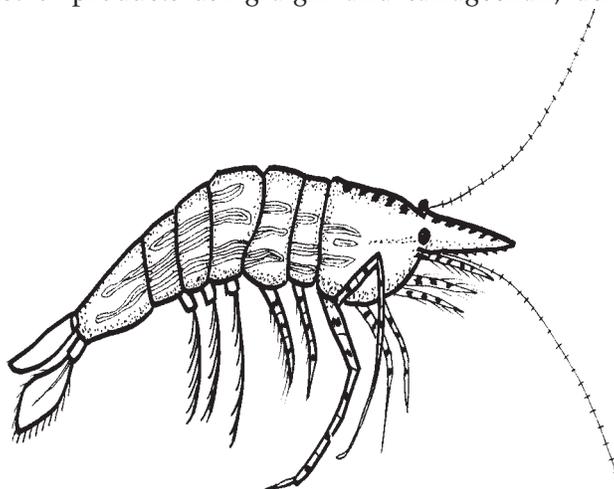
- Draw a mural of a beach scene and have each student add to it, filling in the picture.
- Try Gyotaku, fish printing. Compare a flounder to a salmon.
- Make clam shell rubbings and note differences in shells.
- Use the shapes of plankton as part of a painting.
- Make plaster castings of shells.
- Create a photo essay of a day in an estuary.
- Draw a comic strip about a hermit crab.

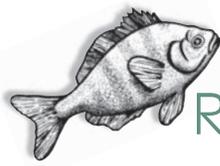
### Music

- Make a sound collage of an estuary.
- Try to imitate bird songs, animal calls. Tape yourself.
- Make a reed flute, clamshell chimes.
- Play music that reminds you of water. (*The Moldau* by Smetana, *LaMer* by Debussy)
- Sing sea chanties.

### Health

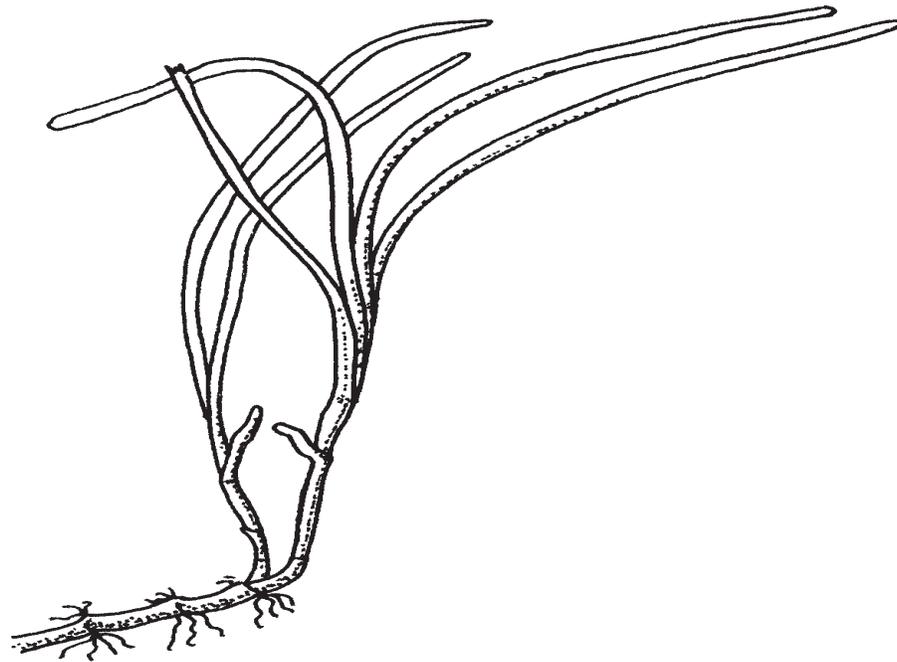
- Prepare a menu for breakfast, lunch and dinner using food from the estuary—a seafood feast!
- Make a list of products using algin and carrageenan, derivatives of algae.

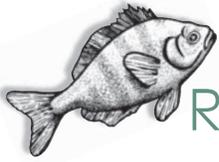




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## Resources

### Children's Books

Cherry, Lynne, *A River Ran Wild*, New York: Harcourt Brace & Company, 1992.

Cone, Molly, *Come Back Salmon*, Hong Kong: Sierra Club Books, 1991.

Cole, Joanna, *The Magic School Bus at the Water Works*, New York: Scholastic Inc., 1986.

Cole, Joanna, *The Magic School Bus on the Ocean Floor*, New York: Scholastic Inc., 1992.

Earthwork Group, *50 Simple Things Kids Can Do To Save the Earth*, Kansas City: Andrews & McMeel, 1990.

Hirschi, Ron, *People of Salmon and Cedar*, New York: Cobblehill Books, 1996.

Holling, H. Clancy, *Pagoo*, Boston: Houghton Mifflin Co., 1969.

Lewis, Barbara A., *The Kid's Guide to Social Action*, Minneapolis: Free Spirit Press, 1991.

### Magazines

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

Environmental Education Project

P.O. Box 751

Portland, OR 97207

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

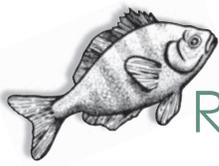
#### ***Ranger Rick***

National Wildlife Federation

1412 Sixteenth Street, N.W.

Washington, D.C. 20036-3366

Outstanding children's magazine packed with incredible photography and age appropriate information.



## Resources

### Reference Books

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

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

Flora, Charles and Eugene Fairbanks, M.D., *The Sound and the Sea*, Bellingham, WA: Western Washington Press, 1982.

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

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

Yates, Steve, *Marine Wildlife of Puget Sound, the San Juans, and the Strait of Georgia*, Connecticut: The Globe Pequot Press, 1988.

Zim, Herbert and Lester Ingle, *Seashores: A Guide to Animals and Plants Along the 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.

#### ***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.



## Resources

### ***Beach Explorations***

Sea Grant Marine Education  
Hatfield Marine Science Center  
2030 Marine Science Drive  
Newport, OR 97365

Written by Gloria Snively, this guide for teachers of grades 5 to 10 includes extensive background information about northwest beach life as well as field trip and classroom activities.

### ***Coastal Zone Studies***

Washington State Office of Environmental Education  
17011 Meridian Avenue North #16  
Seattle, WA 98133-5531

In-depth junior and senior high school curriculum for studying coastal areas, including estuaries.

### ***Discover Wetlands***

Washington State Department of Ecology  
PO Box 47600  
Olympia, WA 98504-7600

A collection of information and activities focusing on wetlands in Washington State for grades 4 to 8.

### ***The Estuary Book and others***

Western Education Development Group  
University of British Columbia  
Vancouver, B.C. CANADA V6T 1W5

This is one of a series of booklets on various water habitats, with information and activities for middle school and older.

### ***The Estuary Study Program***

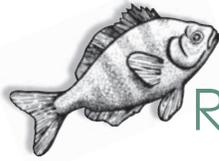
South Slough National Estuarine Research Reserve  
P.O. Box 5417  
Charleston, OR 97402

An imaginative on-site program for upper elementary and junior high school plus classroom activities for senior high.

### ***Hanging on to Wetlands***

Irwin Slesnick  
Biology Department  
Western Washington University  
Bellingham, WA 98225

Interdisciplinary classroom and field activities for studying wetlands.



## Resources

### ***Naturescope***

National Wildlife Federation

1412 Sixteenth Street, N.W.

Washington, D.C. 20036-3366

A creative education series introducing children to the natural world. Sixteen books cover such topics as oceans, wetlands, mammals, birds, and endangered species.

### ***OBIS: Outdoor Biology Instructional Strategies***

Delta Education, Inc.

Box M

Nashua, NH 03061-6012

Creative and active ideas in environmental education, marine studies included; for all ages.

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

Marine Education Project

Pacific Science Center

200 Second Avenue North

Seattle, WA 98109

(206) 443-2001

Interdisciplinary curriculum for grades 1 to high school with topics including salmon, tides, beaches, oceanography, marine biology, and early fishing peoples of Puget Sound.

### ***Project for Sea***

Marine Science Center

17771 Fjord Drive N.E.

Poulsbo, WA 98370

Extensive and exemplary curriculum for all grade levels; content includes animal and plant identification and ecological concepts; award winner.

### ***Project WET***

Rhonda Hunter, Project Wet Coordinator

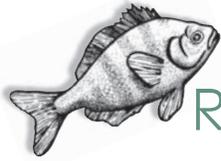
Washington State Department of Ecology

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



## Resources

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

The Seattle Aquarium

Pier 59, Waterfront Park

Seattle, WA 98101

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

### ***WOW!: The Wonders of Wetlands***

Environmental Concern Inc.

PO BOX P

St. Michaels, MD 21663

Comprehensive classroom and outdoor wetland activity for grades K to 12.

## **Places**

### **Bellingham Maritime Heritage Center**

1600 "C" Street

Bellingham, WA 98225

(360)676-6806

### **Discovery Park**

3801 West Government Way

Seattle, WA 98199

(206)386-4236

### **Marine Life Center**

1801 Roeder Ave.

Bellingham, WA 98226

(360)671-2431

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

Fort Worden State Park

Port Townsend, WA 98368

(360)385-5582

### **Poulsbo Marine Science Center**

17771 Fjord Drive N.E.

Poulsbo, WA 98370

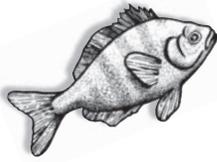
(360)779-5549

### **The Seattle Aquarium**

Pier 59, Waterfront Park

Seattle, WA 98101

(206)386-4300



Everything in nature changes; this program, too, is evolving. We are always in need of, and grateful for your ideas and constructive feedback. Please feel free to send us your thoughts and suggestions about this curriculum and your experience at Padilla Bay.

Thank you so much!

