

Unit Four

Fishing Then and Now

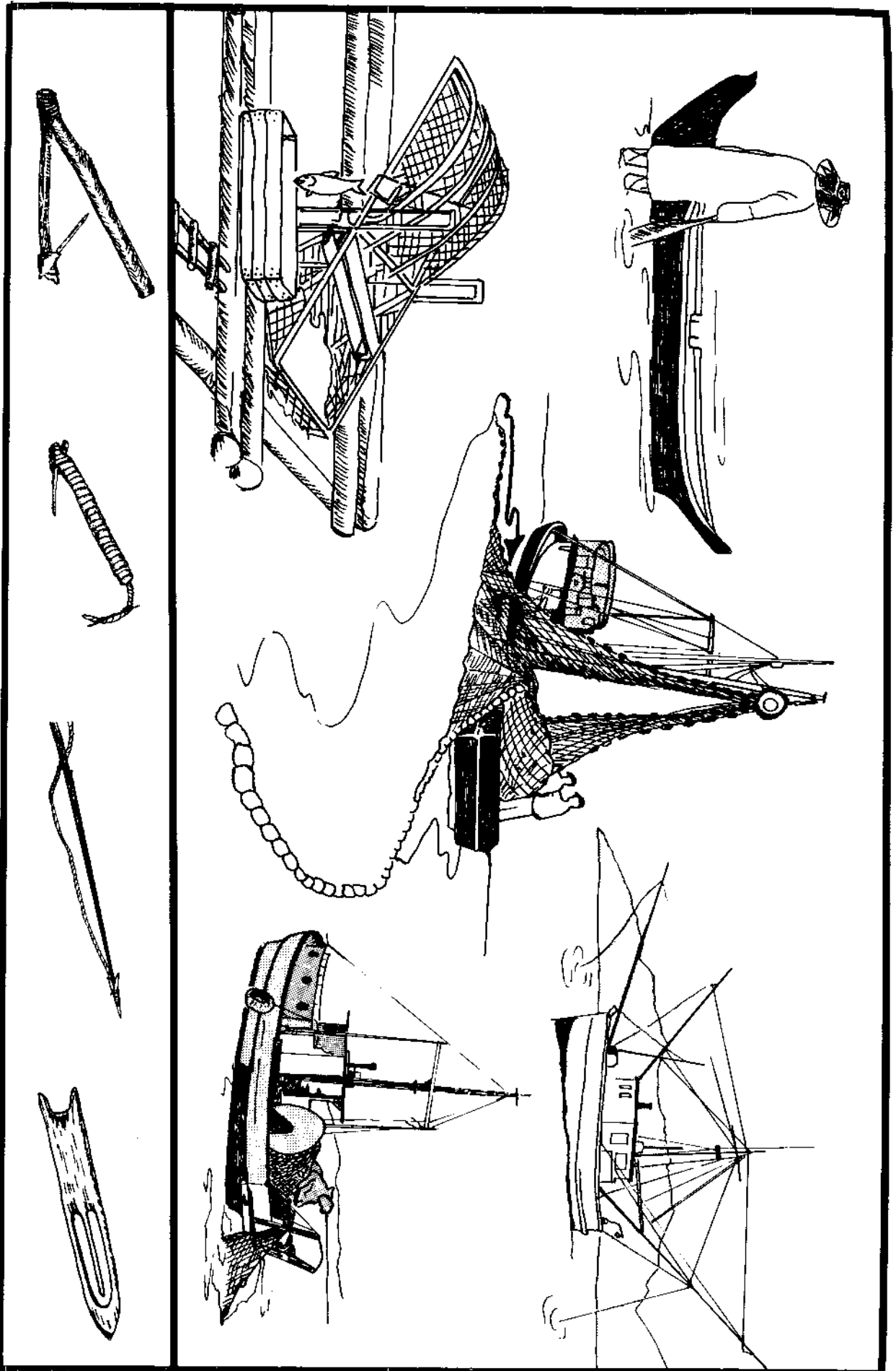
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Objectives:

To help the student:

- Read and listen to fishing legends (Activity 1).
- Research local fishing legends (Activity 1).
- Make a spear, hook, line, float, sinker, net, and/or fish trap (Activity 2).
- Learn about halibut hooks (Activity 2).
- Construct a model fish wheel (Activity 3).
- Read about fish wheels (Activity 3).
- Participate in a jigging derby (Activity 4).
- Practice gillnetting (Activity 5).



Unit Four: Fishing methods, clockwise from bottom left: pieplants from left: native Alaskan halibut hook, fishhook, fishwheel, baidarka, purse seiner, troller, gillnetter. Im-
spear, and net needle.

- Explain why undersize fish and shellfish incidently caught in the net are the fishermen's future (Activity 5).
- Diagram purse seining techniques (Activity 6).
- Pantomime how a troller catches and takes care of his fish (Activity 7).
- Write a story or poem or draw cartoons about longlining for halibut (Activity 8).
- Read about gillnetting, seining, trolling, and longlining (Activity 5-9).
- Construct model shrimp trawls and crab pots (Activity 9).
- Match crab and shrimp descriptions with their pictures (Activity 9).
- Map a local harbor (Activity 10).
- Observe different types of fishing boats (Activity 10).
- Interview a local fishermen and harbor masters (Activity 10).
- Write a newspaper story about the local harbor or waterfront (Activity 10).

Rivers, lakes and the sea are traditional sources of food for Alaskans. Natives observed and studied the animals to learn where they lived and how their behaviors and appearances changed with the seasons. They knew when and how marine or freshwater animals were best to eat. They devised ways to catch fish and mammals with nets, hooks, harpoons and traps. They learned how to preserve their catch so there would be food throughout the year. Such ties to northern waters are reflected in the legends and traditional beliefs of Alaska's Native people.

As non-Native people began to settle in Alaska, they, too, turned to the waters for food. They learned from Alaska's Native people and brought and introduced new ideas and technologies.

With time, outside markets developed for Alaska's rich marine resources. With the markets came commercial fishing, whaling, canneries, salteries, imported labor and regulation and management of the resources.

The state of Alaska divides fishing into four categories: subsistence, personal use, commercial and sport. Subsistence fishing is for food on which one depends directly. Personal use is a category established recently by the Alaska Boards of Fisheries and Game. It is a non-priority designation,

usually established on a temporary basis to allow extra harvests whenever there is a surplus of fish in a particular area. Commercial fishing is a term used to cover all fishing done by fishermen licensed by the state to take and sell a particular species. Commercial fishing began in Alaska during the late 1800s. Sport fishing is primarily for pleasure, although sport-caught fish may form a considerable part of the food supply for those who catch them.

Regulations for these fisheries are set by the Alaska Board of Fisheries. Local advisory committees and individual Alaskans can and do propose changes in these regulations. The Alaska Department of Fish and Game supplies management data and information to the Board and the fish and wildlife protection officers in the Department of Public Safety enforce the regulations.

Today, Alaska's fisheries and the many people dependent upon them are a complex mosaic. To begin to understand it, students will have to learn about many lifestyles, past and present. This and following units present information about how the lives of Alaskans are linked to seas and rivers. The materials here, however, are only a beginning. Exploration of fisheries resources is best individualized for each community.

Activity 1

Fishing Myths and Legends



Background:

Myths serve to explain some phenomenon of nature, the origin of man, or the customs, institutions and religious rites of a people. They can be defined generally as "sacred" stories.

Legends usually ascribe fanciful or fantastic deeds to a particular place or person.

The two terms have been used with such latitude that it's often difficult to label a story "myth" or "legend." If the question should arise among students, one way to judge the difference is to ask whether the story has a moral. Does it explain why the sun sets, or why the tide moves in and out, or what happens to parents who treat their children cruelly? If so--if it explains a phenomenon or belief, it can be called a myth. If it simply ascribes fantastic deeds to a person or place, without any particular moral, it can be called a legend.

By such a "morality criterion," the stories Raven and the Fog Woman

and How the Fish Came Into the Sea in this activity are myths, while Raven Is Swallowed By Big Fish appears to be a legend.

Folklore is the whole body of oral tradition--myths, legends, music, games, dances, strengthening properties ascribed to certain foods and herbs--that is passed from generation to generation.

Vocabulary:

- myth
- legend
- folklore

Materials:

- paper
- pencils
- tape recorder
- village elder
- Raven and the Fog Woman Legend
- Raven Is Swallowed by Big Fish Legend
- worksheet:
...How the Fish Came to the Sea (4A)

Procedure:

1. Discuss how traditions are passed from generation to generation. In the old days, the abilities to listen and remember were vitally important because there was no written language. Explain that students long ago were very skilled at listening. Mention that you will be reading them a Tlingit myth and an Athabascan legend. Afterwards, see how well they do at telling the stories back to you!
2. Explain to students that Raven is an important figure in Alaskan Native traditions.

Raven, who created the world, is wise and cunning and full of trickery. To set the mood, have the students

sit around on the floor as if you were telling them the stories around the campfire on a summer evening.

RAVEN AND THE FOG WOMAN

Raven wanted to get married. He went to the chief called Fog-Over-the-Salmon, who had a daughter of marriageable age. The chief was glad that Raven wanted to marry his daughter but he said,

"You must promise to treat my daughter well. You must have respect for her, and look after her. If you behave badly, she will leave you and you won't get her back."

Raven agreed to what the chief demanded, and the couple were soon married. They lived contentedly in the village near the water all summer and fall. Then winter came and they were without food.

One bleak, rainy day, after they had been hungry for some time, Raven's wife started making a basket.

"What are you making a basket for?" asked Raven testily. "We have nothing to put in it."

His wife did not answer him, but continued making the basket until it was very big.

That night they went to sleep hungry again, and the next morning when the Raven woke up, he saw his wife sitting on the floor, washing her hands in the basket. He got up to look at what she was doing, and when she had finished, there were salmon in the basket! These were the first salmon ever created.

Raven and his wife were very glad, and they cooked and ate the salmon. Every day, she did the same thing: she washed her hands in the basket, and when she had finished, there were salmon in it. Soon, their house was full of drying salmon, and they had plenty to eat.

After awhile however, Raven forgot that he owed his good fortune to his wife. He quarreled with her. Every day they would exchange bad words with one another; and in the end, Raven got so angry he hit his wife on the shoulder with a piece of dried salmon! He had forgotten the words of his father-in-law, the chief.

Raven's wife ran away from him. He chased her, but when he tried to catch hold of her, his hands passed right through her as if through mist. She ran on, and every time Raven clutched her body, there was nothing to hold on to. He closed his hand on emptiness.

Then she ran into the water, and all the salmon she had dried followed her.

Her figure became dim and she slowly disappeared into the mist. Raven could not catch her, because she was the fog.

Raven went to his father-in-law, Chief Fog-Over-the-Salmon, and begged to have his wife returned. But his father-in-law looked at him sternly, and said,

"You promised me that you would have respect for my daughter and take care of her. You did not keep your promise. Therefore you cannot have her back."

From Booklet IV, Alaska Multimedia
Education Program, Alaska State
Museum. Adapted from John R.
Swanton's Tlingit Myths and Texts
(1909).

RAVEN IS SWALLOWED BY BIG FISH

Raven was by the seashore. Along came Big Fish. Raven said, "We are cousins."

Big fish was doubtful but Raven said, "yes, we are. My father and your mother were brother and sister. Look in my mouth and you will see."

Raven opened his mouth and Big Fish looked in. Then Raven said, "Open your mouth so I can see."

And Big Fish opened his mouth. Raven said, "Open wider."

Then Raven ran right down Big Fish's throat into his stomach. He made camp there. He cut out strips of fat and made a fire. Big Fish dove deep into the water and swam all through the seas, but he could not get rid of raven. Finally he swam near shore.

Raven started up Big Fish's gullet. When he got near the heart he stopped. He took his knife and cut into Big Fish's heart and cooked and ate all. Some Indians saw the dead creature stranded on the shore. They thought, "Good, here is lots of meat."

They went to the body and began to cut it open. When they slit open the belly, a burst of air shot out, followed by some smoke and a little black thing that went shooting off into the trees. This was Raven. He changed into a man and came back to the Indians. He said, "You better not eat that meat for it is poison. Don't you see it smoking?"

The Indians all went off, and Raven had the fish for himself.

-told by Chisana Joe and recorded in The Upper Tanana Indians, by Robert A. McKennan

3. Discuss how the seas and rivers and their creatures are important to Alaskan Natives. Ask the students:

- How are these stories similar to modern life?

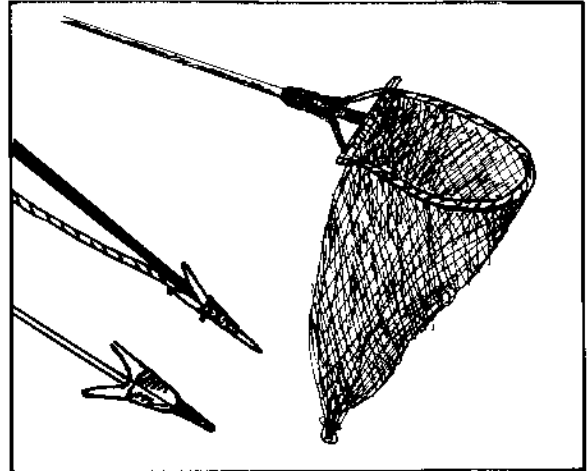
- What lessons can you learn from these stories?

Then have the students try to repeat the stories in the proper sequence.

4. Allow students time to read the worksheet How the Fish Came Into the Sea. This is a Tlingit myth that accurately defines, with the sequence in which the doors are opened, the order of Alaskan annual fish migrations. The fish that "stop," or stay, are those that do not migrate. This myth was taken from Hilary Stewart's Indian Fishing: Early Methods on the Northwest Coast (University of Washington Press, Seattle and London, 1977) and was told by Billy Wilson, a fisherman and silversmith, when he was 84--just the year before he died.
5. Collect local folklore. Ask students about village elders in their community who might know some oral traditions about fishing, and would like to share them in their homes or in the classroom. Have students practice interviewing each other and using a tape recorder. Discuss interview techniques (how to make the person you're interviewing feel at ease; how to be at ease yourself; remembering everything said in case the tape recorder doesn't work; going over the tape right away so if there are blank spots you can fill them in, etc.). The school bilingual staff should be of great help in executing this activity.

Activity 2

Traditional Fishing Methods



Background:

Successful sea and river harvests literally were matters of life or death to Alaskan Natives and early settlers. Fishing methods that evolved from long and careful observation, from trial and error, and from sudden inspirations have been perfected through long use by many generations. Today, some Eskimos and Indians still move to summer fish camps where salmon or other foods from the seas or rivers are gathered and preserved for winter use. In the wintertime, ice fishing remains a traditional harvest method.

Vocabulary:

- netting needle
- weir

Materials:

- stones
- twine
- string
- sticks
- chunks of wood
- sandstone or sandpaper
- bone

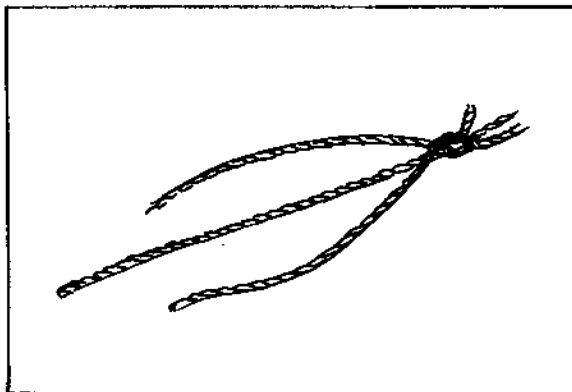
- netting needles
- knives
- traditional fisherman or woman
- worksheet:
...Halibut Hooks (4B)

Procedure:

1. Ask the students:

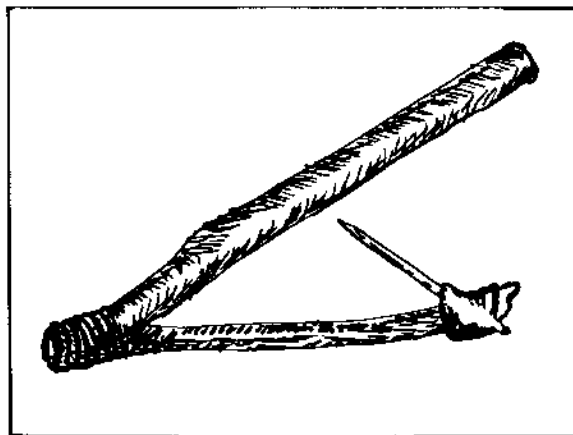
- If you were lost in the woods (or tundra), or went down in a plane next to a lake or stream, would you know how to make something with which to catch fish? (That's when some old-time fishing techniques would come in handy!)
- What do you know about these old-time fishing methods?
- Do you know someone who could come and show our class some of these fishing strategies? (Well, let's invite them!)

- #### 2. Ask an old-time fisherman or woman to come to the class and demonstrate how to make hooks, sinkers, floats, nets, line, spears and/or traps. Contact the guest ahead of time to offer to round up the required materials. Here are some ideas adapted from Hilary Stewart's Indian Fishing.



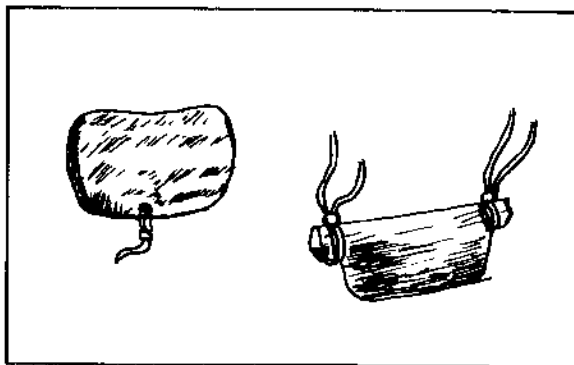
a. Fishing line initially was

made from cedar bark, nettle fibers, animal sinew, or bull kelp stems. Students can learn some of the principles of line (or rope) making by braiding twine. Tie an overhand knot at one end of three pieces of twine. Keep folding first the right, then the left piece over the centerpiece, in the same way as one braids hair.

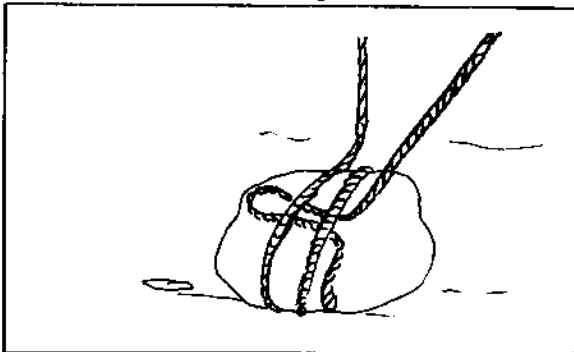


- #### b. Hooks can be made by lashing two sticks together, or a piece of bone and a stick. To use a bone, first splinter the bone by smashing it with a stone, then smooth one of the sharp shards with sandstone or sandpaper. Hooks also can be carved from wood. Students can make a variety of sizes and types to try out in one of the local fishing holes. For inspiration, read the worksheet Halibut Hooks. (Answers: 1: yew and yellow cedar; 2: bone or a nail; 3: cedar bark, nettle fibers, animal sinew, or bull kelp stems; 4: rock; 5: piece

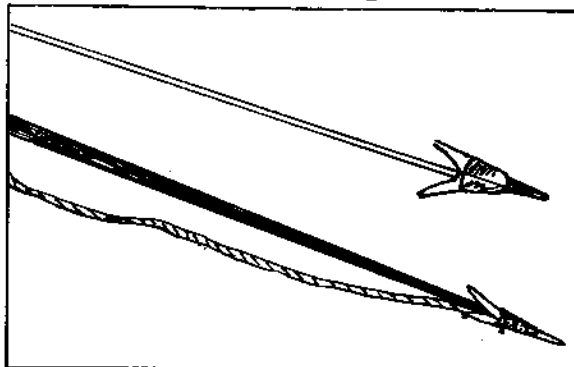
of wood; 6: octopus, herring, etc.; 7: to encourage a spirit helper to aid in catching the halibut; 8: several hours or days)



- c. Floats can be carved out of chunks of wood. They can be fancy ones as were used for catching halibut or plainer ones for gill nets.

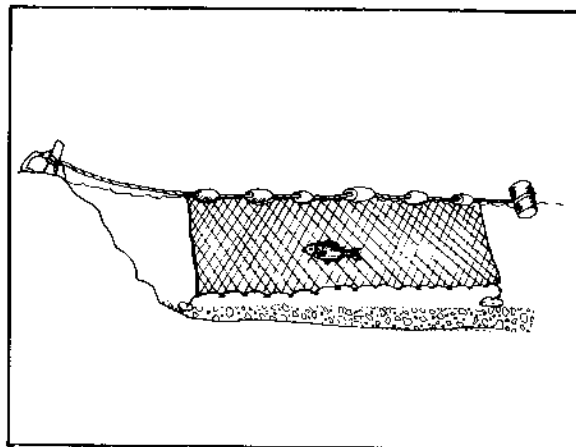


- d. Sinkers can be made from stones or rocks for hook and line fishing, or for placement at the bottom of a gill net.

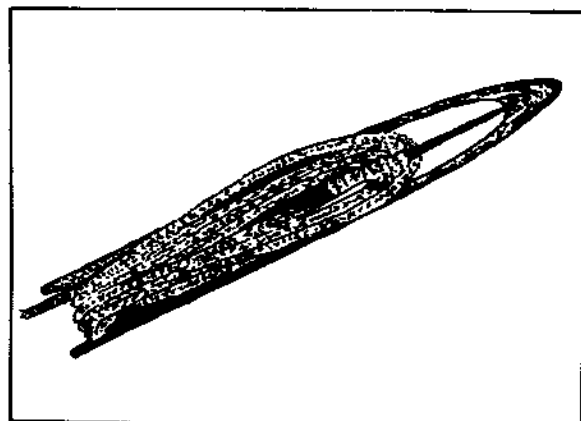


- e. Spears or harpoons can

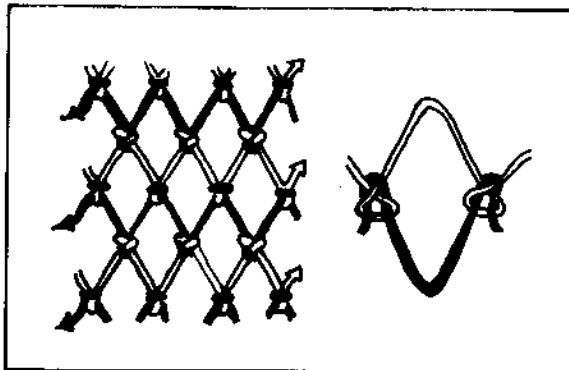
be made from pieces of bone, metal, carved wood or stone lashed to a long stick.



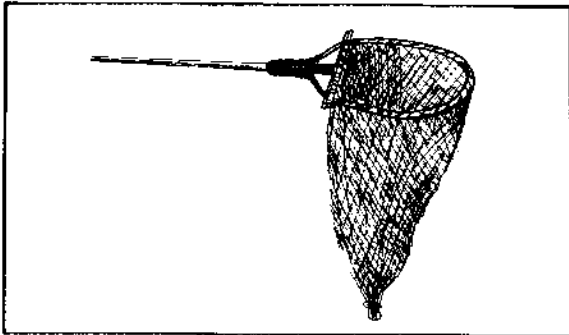
- f. Netmaking is a real art. Students can carve or buy netting needles and use string or fishline to make small sample nets. Modern fishing nets differ only in material, not in form, so it should be possible to find someone to practice netmaking with your students. Run the



heavier cork line and heavier sinker line between two chairs then run a lighter weight line down the sides. Wrap your netting needle (not too full) with the fishing line. Begin in one of the upper corners with



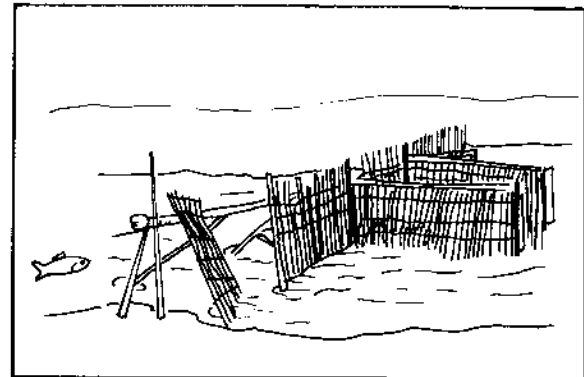
the knot illustrated here. Make a net size gauge out of a wood chunk to keep the mesh uniform. Nets with king salmon mesh should be 4



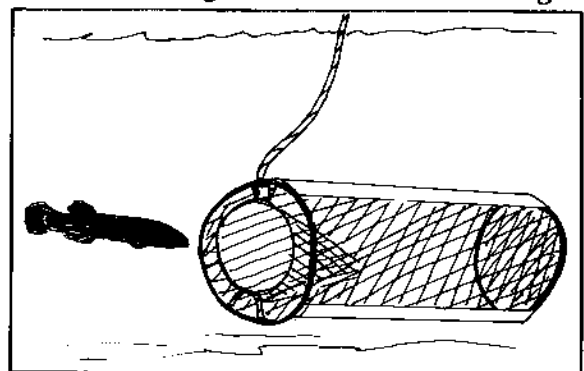
by 4 inches; other salmon nets about 2 3/4 inches by 2 3/4 inches; and herring nets 1 1/4 inch by 1 1/4 inches so that the fish will stick its head through and get stuck behind its gill. Add handmade floats and sinkers to complete your gill net. Or dip nets can be made with similar techniques.

- g. Students also can make belts, basketball goal nets, and other craft items. See teacher's reference bibliography entry for netmaking by Charles Holdgate. Traps and weirs probably are the most productive of any fishing devices, due

primarily to the salmon's urge to run upstream. Salmon traps were used first by Natives, and later by commercial canneries. These traps



were the scenes of many bitter battles; and in some cases, whole runs of salmon were wiped out by overharvesting. Salmon traps are now illegal (except for use in one area of Southeast Alaska). Alaska Department of Fish and Game biologists do use weirs in their biological work, but the fish are merely counted, not harvested. Weirs and traps can be made of sticks lashed together with string.

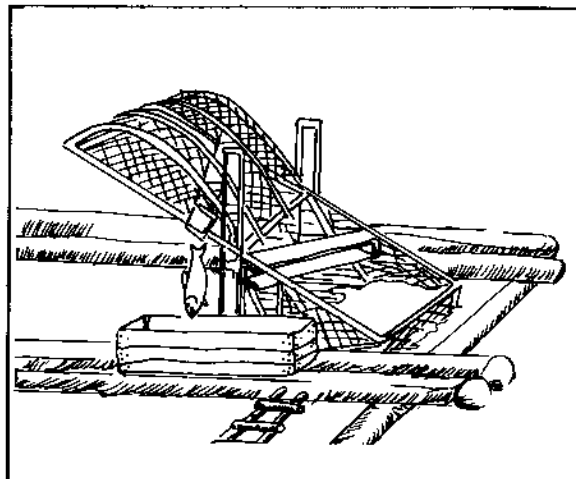


One trap that students might especially enjoy making is a blackfish trap, which is legal.

3. Now have students put their

fishing gear together and try it out as an after-school project. Be sure to familiarize the class with local fish and game regulations ahead of time. Pick up a copy of the regulations at any place in your community where licenses are sold or write to the Alaska Department of Fish and Game, Box 3-2000, Juneau, Alaska 99801.

Activity 3 Constructing a Fish Wheel



Background:

The fish wheel was introduced to Alaska by white settlers about 1900. Its coming revolutionized Interior Alaskan life because salmon for people and dogs could be caught more easily. People could afford to have enough dogs to run teams and hunt, trap, and travel much greater distances in wintertime.

Vocabulary:

- axle
- basket
- bearing block
- chute
- debris
- fish wheel
- stanchions
- spar

Materials:

- sticks
- string
- glue
- small pieces of wood
- nylon window screening
- scissors
- knife

- map of Alaska
- worksheet:
...Fish Wheels (4C)

Procedure:

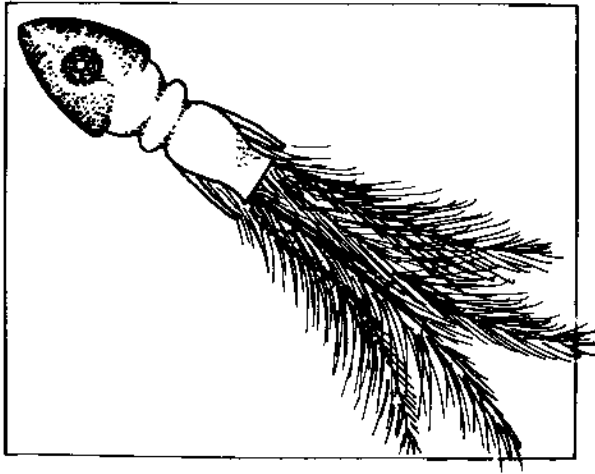
1. Ask students to tell you what they already know about fish wheels. Then pass out the worksheet Fish Wheels and read it individually or as a class. You'll need a map of Alaska to answer the last question on the worksheet. A good reference for any additional questions is Kathleen Lynch's Fishwheels and How to Build Them (see Teacher's Reference bibliography) whence came the information for this activity. (Worksheet answers: 1: since 1900; 2: the river's current;

3: the fish are caught in the revolving baskets as they migrate upstream; 4: storage box; 5: commercial fish; 6: Yukon, Tanana, Kuskokwim, Copper)

2. Have the students make a model fish wheel from the drawing on the worksheet and a variety of materials (sticks, string, glue, small pieces of wood, nylon window screening, scissors, knives) stock-piled in the classroom. If there is anyone in the community familiar with fish wheels, ask them to help supervise the project. Visit any nearby fish wheels so students can see how closely their models match the real item.

Activity 4

Jigging Derby



Background:

Jigging has been used as a fishing technique both winter and summer for centuries. Today jigging machines are being used to catch ocean whitefish.

The idea for this fun activity comes from Jim Gall at Kotzebue Elementary in Kotzebue. These procedures can be used in other areas of the state with other fish species and other types of fishing gear. But be careful not to decimate your local fish population. Check with a fisheries biologist before beginning the contest. You may need to strictly limit student fishing time or methods to save some fish for next year.

Vocabulary:

- jigging lure

Materials:

- ice chisel, ax or auger
- jigging sticks and helping sticks
- lines
- lures and bait if needed

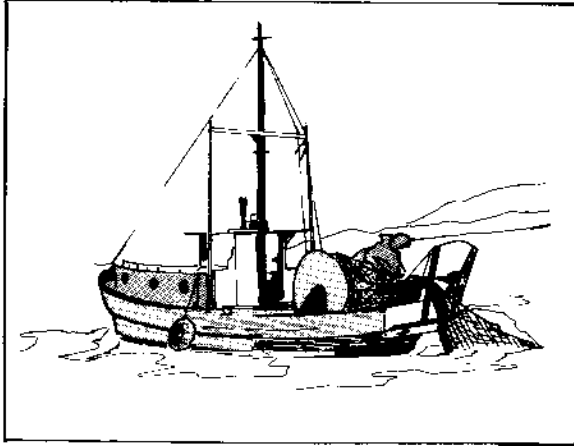
- ice skimmers or old cups or strainers
- sled (on which to sit and carry gear and fish)
- knife
- pliers
- spare line and lures
- weighing scale
- measuring stick

Procedure:

1. Discuss local fishing techniques. Invite a village elder to your class and discuss jigging for fish and ice safety tips on weather, breakup, ice chisels, axes, ice augers, lures, knots, bait, barbed and barbless hooks, fish cleaning and preservation and use.
2. Plan a school-wide one- or two-week jigging derby in which students hook fish before and after school. Make up contest rules. Some suggestions:
 - a. Hook a tomcod between Monday _____ and Sunday _____.
 - b. Bring it into room _____ for weighing and fin clipping any school day from _____ to _____ a.m. or from _____ to _____ p.m.
 - c. Sign an "official on-my-honor" form that says you actually caught the tomcod and caught it during derby week.
 - d. Last day for entries is _____, so you can hook during the weekend.
 - e. Winners announced on _____.

- f. Prizes will be given to each boy and girl at each grade level who catches the most and largest tomcods.
3. Also plan a daylong derby day, in which each class spends an hour hooking fish as part of the physical education and science program. Send home permission slips and make sure each child dresses warmly, and has a hooking stick and bag with his or her name on it in which to carry the fish back to school. Plan hot drinks and snacks when each class returns to school. Invite parents to assist with the derby and alert them to alternative plans in case of bad weather. Arrange to donate leftover fish to a convalescence home or similar facility.
4. Discuss derby plans with other teachers and your principal.
5. Round up weighing scales, a measuring stick, sled, knife, pliers, spare lines and lures. Cut ice holes ahead of time and mark their locations.
6. Review ice safety procedures. Each student should have a buddy, dress warmly and return when the whistle blows. Head counts should be taken frequently.
7. Enjoy the day!
8. Follow up with demonstrations of fish cleaning, preservation, and tasting.

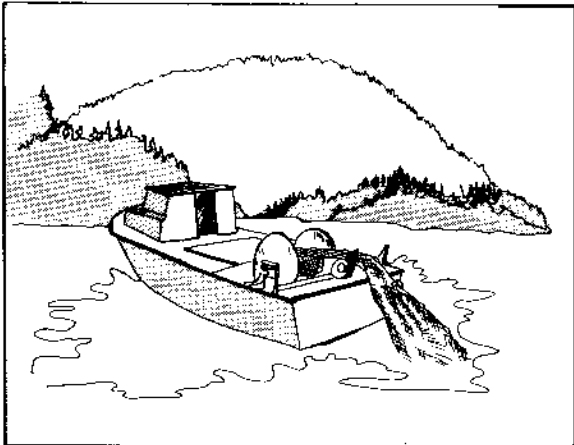
Activity 5 Gillnetting



Background:

Gillnetting, as the word implies, means catching fish by their gills in a net. This is the principle behind both set and drift gillnetting.

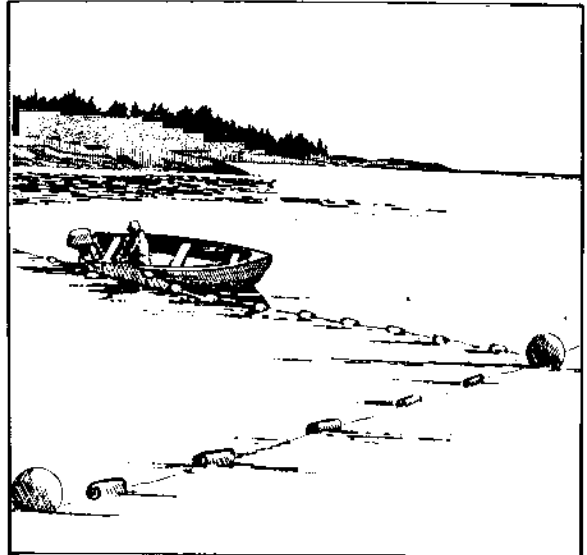
Gill net fisheries concentrate primarily on returning runs of salmon and herring as they near their spawning grounds. Because of this, they are closely managed by the Alaska Department of Fish and Game. Regulations are set by the Board of Fisheries to govern when, where and what kind of gear can be used.



Drift gillnetting means setting the gill net from a boat, then tending

the net as it drifts and fishes. Boats used for gillnetting come in all sizes and shapes. Some are as short as 16 feet, others longer than 40 feet. The boats can be rigged to pick the net up over the bow or the stern and thus are termed bowpickers or sternpickers.

Gillnetting may be carried out as a one-person operation, but most often a gill-netter will have a partner. If a reel is used to pull the net, for example, it is efficient to have one person on each side of the net, using gloves or a short hooked tool to release salmon tangled in the net.



Setnetting operates on the same principles as drift gillnetting, except that the set net is stationary and set out from an anchor on shore rather than being left adrift. Set net sites are for the most part traditional, and many sites have been used by families for years.

In both kinds of gillnetting, a cork line keeps the upper edge of the net floating and a lead line keeps the net vertical by holding down the lower edge. How long a net is allowed to fish before it is checked and the catch removed

depends on the person fishing the net. One way of judging how well the net is fishing is by noting whether the individual corks along the top of the net are bobbing or being pulled under water. The more fish caught in the net, the more changes can be seen in the cork line. This gives the gill-netter a quick, visual check of whether fish are being caught.

In addition to salmon or herring, various incidental fish and crabs are pulled in with the gill net. These often are termed "trash," but actually these young fish and crabs are the fishermen's future. Many will return later as larger fish or shellfish to be caught by someone in the fishing community--or they will provide food for growing salmon, herring, halibut. Gillnetters should toss these incidental fish back as required by state law, being careful not to mangle them in the rush to clean the net and return to fishing.

Vocabulary:

NOTE: The spellings of set net and gill net vary with context. It's set net and gill net (the net itself); setnetting and gillnetting (activity); set-netter and gill-netter (the person); and gillnetter (the boat; setnetting is not a boating activity).

- reel
- drift gillnetting
- setnetting
- bowpicker
- sternpicker
- cork line
- lead line

Materials:

- old gill net or gill net drawn on butcher paper
- 2 floats

- 2 sets of rubber gloves, rain gear and hip boots
- rulers
- bucket or water basket
- reel or roller on which to wrap net
- magic markers
- local person who gillnets
- construction paper
- scissors
- current prices of salmon or herring on the dock
- worksheet:
...Gillnetting (4D)

Procedure:

1. Encourage students to relate their own gillnetting experiences. Pass out the worksheet Gillnetting and have students read and answer the questions. (1: set and drift; 2: 200 fathoms; 3: 6 fathoms; 4: fish are striking the net; 5: drift; 6: because the fish stick their heads through the net and get caught behind the gills; 7: a bowpicker has the reel or roller in front, sternpicker has the reel or roller in back and picks the fish off the stern.)
2. Bring in a manageable piece of an old gill net (or draw one on a long sheet of butcher paper or newsprint); two large floats for either end of the net; a reel or roller (map tube and broomstick); two sets of rain gear, rubber gloves and hip boots. All this should provide great room decorations in addition to the instructional potential!
3. Roll out the net on one side of the classroom. Hook up the floats at either end and you're fishing! Review the terms "cork line" and "lead line." Have students measure

the mesh size and see if they can tell you the species of fish they'll be catching. (Refer to the netmaking section of Activity 2 for information on mesh sizes.)

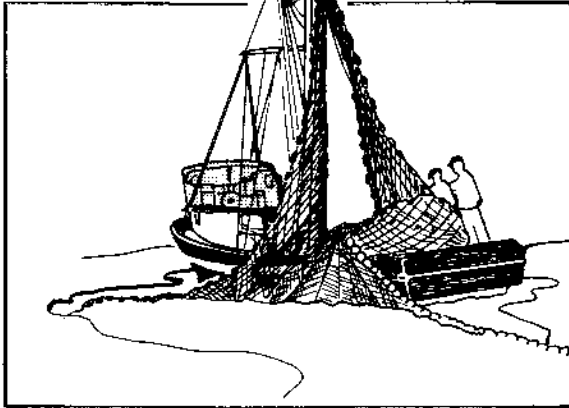
4. Pass out the construction paper and have students cut out a typical catch for your local area. Include salmon or herring and a variety of incidentals: jellyfish, crabs, young bottomfish, young halibut, shrimp, seaweed. Each salmon or herring should be labeled on the back with the amount it weighs.
5. Have the students stick the fish and shellfish in the net, gently bobbing the cork line as the fish strike.
6. Ask for volunteers: two to pick the net; two to manage the reel; two to pitch the fish; two to weigh the fish; one to run the tender; one to pump gas and sell groceries; one to pay the gillnetters.
7. Have the gillnetters put on the hip boots, rain gear, and rubber gloves and place the rest of the students appropriately around the room.
8. As the gillnetters pull the net, discuss what they will do with the fish as they pick them out of the net. (Ideally they should be placed carefully in a fish bin--an iced bin if they are a long way from the tender, especially if the weather is warm. Fish should always be grasped by

the head or body rather than the tail to retain their quality.)

- What should they do with the other incidental fish and shellfish? (State law requires that they be pitched overboard. These fish are the fishers future--the ones that will come back later as large fish and crabs, or the ones that will provide food for growing salmon, herring, and halibut. So students should carefully untangle them from the net and gently drop them overboard. They are an important part of the ocean's food web.)
9. After the gillnetters have picked the net, they may want to set the net again or head for the tender. There they can deliver the fish, buy groceries and gas (remember no smoking while the gas is being pumped!). As the fish are being weighed, have a student record their weights on the board. Students should multiply the total weight times the price per pound and then subtract the prices of groceries and gas to determine the amount the gillnetter will be paid. They can either be given a fish ticket or cash, depending on the type of tender.
10. Invite a local gillnetter to visit the class, answer questions, and discuss gillnetting techniques and safety.

Activity 6

Purse Seining



Background:

Purse seining was first tried in the United States on the East Coast in the early 19th century. It is a method that has been used in the Pacific salmon fishery since its beginning and has probably been more economically valuable to the salmon fishery than any other method. In purse seining, a large net is issued to encircle a whole school of fish at one time. After the school is surrounded, the bottom of the net is pursed, or drawn shut, preventing the fish from diving to escape.

On the first seine boats the nets were pulled by hand, an effort requiring many men and much muscle. By the mid-20th century, hydraulic systems were developed to do much of the work previously done with muscle power. In the early 1950s, the power drum and the power block were first used on seiners. Both the drum and the block are hydraulically run and both help bring the net onto the boat. The power drum was quickly outlawed in Alaska because it was so effective and because fewer crew are needed. Alaska has so many fishermen and women that with the power drum, the catch would be harvested too quickly (or

overharvested) and they would not be as many crew jobs. The power drum is still used in Washington, Oregon, and British Columbia—but Alaskans use the power block, a large unit that looks like a pulley and hangs from a boom angled upward above the boat's work deck.

As in all commercial fisheries, many state regulations apply to the seine fisheries. Seine boats operating in Alaska can be no more than 58 feet long, hence the term "limit seiners." The length of the seine net is also regulated, and the limit differs depending on the area to be fished. In Southeast Alaska, for example, the seine nets used for salmon must be between 150 and 250 fathoms long (six feet = one fathom). In Prince William Sound it must be between 125 and 150 fathoms long. The net depth and mesh size also are regulated. Where and when seining may occur is determined by the Alaska Board of Fisheries, and is based on a combination of two factors: the number of fish needed to enter the river system to reproduce, and the number of fish from the "run" already caught that year.

Vocabulary:

- seiner
- power block
- boom
- seine skiff
- jitney
- fathometer
- diagram

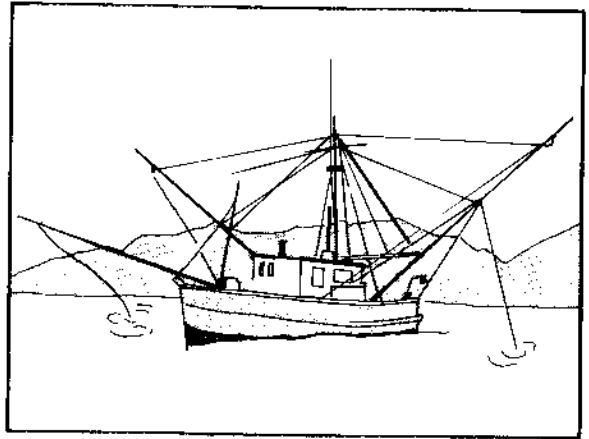
Materials:

- paper
- pencils
- seine captain or crew member
- worksheet:
...Purse Seining (4E)

Procedure:

1. Discuss information that students have heard about purse seining. Pass out the worksheet Purse Seining and have students answer the questions. (1: to pull the seine around a school of fish; 2: by relying on past knowledge of where the fish have been, plus currents and tides and a recording fathometer; 3: the top of the net where the floats are; 4: the bottom of the net where the lead weights are; 5: pull in the net; 6: scoop them out with the brailer; 7: 4-6; 8a: \$180.30; 8b: \$19.83; 8c: \$260.80; 8d: \$29.24; 8e: \$49.07.)
2. Have students get out papers and pencils. Ask the students how they explain something complicated to other people. (One of the best ways of passing on information is by pictures--by drawing a diagram.) Have the students individually diagram how a purse seiner works. They can draw everything on one picture or they might try a series of pictures or cartoons.
3. Have students exchange diagrams and see if the explanations and labels are clear.
4. Invite a seine captain or crew member to show slides or pictures and tell of some of their adventures and critique your diagrams.

Activity 7 Trolling



Background:

Trolling is a line fishery, which means fish are caught one by one, or a few at a time.

Because a troller catches just a few fish at a time, the fish are landed more carefully. After a fish is swung aboard with the gaff (a wooden club with a steel hook at the end), it is cleaned and rinsed. Then it is carefully bedded in ice, or placed in a slush tank filled with ice and sea water, or frozen. Troll-caught fish have a higher market value because of their quick, immediate and careful handling.

Trollers traditionally have been the most independent and the least restricted of salmon fishermen. Restrictions on them, however, are increasing annually. Until recently, both power and hand trollers could fish year-round anywhere from Ketchikan to Yakutat. Unlike gillnetters and seiners, they were not limited to brief "open" fishing periods.

Vocabulary:

- troller
- gurdies

- gaff
- pantomime

Materials:

- map of Alaska
- person who works on a troller
- worksheet:
...Trolling (4F)

Procedure:

1. Ask students what they know about trolling. Ask if anyone can imitate a troller. Explain that silent imitation is a form of acting called mime or pantomime. Mime players often paint their faces so that the audience can see their expressions more clearly. Charades is a common party game that similarly relies on silent imitation. To imitate trollers, so that anyone can tell what's happening, students will have to find out everything they can about trolling.
2. Distribute the worksheet Trolling and have students read and complete the questions. You'll need to have an Alaska map handy for question 6. (Answers: 1: by the two or more long poles sticking up in the air or out to the sides; 2: fish are individually caught, carefully cleaned and chilled; 3: kings and cohos; 4: gurdies; 5: Southeast Alaska from Ketchi-

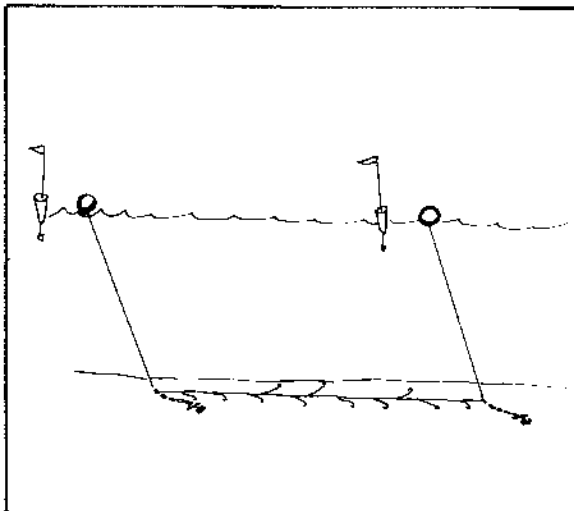
kan to Yakutat; 6: 430 miles; 7: to refer to the boat or to the person who fishes it; 8a: \$698.20; 8b: \$454; 8c: \$506.10)

3. Have the students practice their pantomiming skills as a class. Perhaps start by having them silently bait hooks. Other suggestions:

Ohh--did somebody hook their finger? Indicate that the boat is rolling a bit with the swells. Drop the baited hooks overboard and watch them slowly go out behind the boat. Ding, the bell on one of the poles rang indicating a hit. Better get busy pulling it in. Boy it's a big one--a 60 lb king! Use a gaff to haul it on board. Then bait the hook, drop it in again. Clean your fish and hold it up to admire! Isn't trolling great?

4. Divide the class into small groups and have each group invent a trolling adventure and practice pantomiming.
5. Have each group perform, and let the other guess what they were doing. Invite a troller to come and critique the mime performance and to tell stories, answer questions and demonstrate gear.

Activity 8 Longlining



Background:

Longlining is the primary method used in Alaska to catch halibut commercially. Incidentally caught halibut picked up by trollers also can be sold, if caught when halibut season is open.

Halibut fishing in the northeastern Pacific is regulated by a joint U.S.-Canadian Commission called the International Pacific Halibut Commission (IPHC). The commission watches over the fishery, and decides when and where fishing can occur. Before the beginning of the fishing season, the IPHC announces the times and places halibut fishing will be allowed in the waters of the two countries. As the season goes on, the halibut catch is monitored. If it is high, some of the scheduled fishing times, or openings, are canceled or shortened.

The size of halibut that may be kept is regulated for commercial fishing. Fish shorter than 32 inches must be released and returned live to the sea.

Vocabulary:

- longlining
- skates
- gangions

Materials:

- paper
- pencils
- person who fishes halibut commercially
- worksheet:
...Longlining (4G)

Procedure:

1. Ask students if they have ever gone halibut fishing. Introduce longlining as the way halibut are caught commercially. Pass out the worksheet Longlining and have students read and answer the questions. (Answers: 1: halibut; 2: tuna, swordfish, and sharks; 3: a skate; 4: gangions; 5: anchor, buoy line, buoy, and 17-foot pole; 6: so the groundline and gangions will be held on the bottom and so the gear won't drift away; 7: they're so big; 8: by the bundles of tall poles with flags and lights on them and by the longline gear with hundreds of hooks.)
2. Discuss halibut life cycles and the halibut's need for shallow nearshore waters and estuaries for rapid juveniles growth. Order the Sea Grant Life Cycle Poster (see bibliography) and read Alaska Tidelines "The Old Woman," Vol. IV, No. 6, March 1982.

THE LONGLINERS

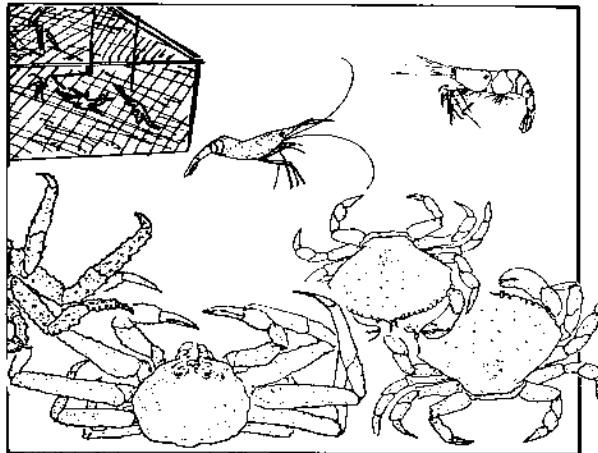
Yes, give me a packet that's sound and tight.
And a skipper with guts to boom her
Up under the heel of the northern lights
Where the grey seas strive to doom her.
Through the grinding ice where the ground lines freeze,
Through the howling gale and the pounding seas--
Into such tranquil spots as these
You must drive with a halibut schooner.

--from "The Doryman" (author unknown)

3. Have students write stories and poems, or draw cartoons about halibut longlining. Invite someone who fishes halibut to tell some of their adventures as an incentive for accurate, creative big fish stories. Ask them to describe some of the current issues in the halibut fisheries.

Activity 9

Shrimping and Crabbing on the High Seas



Background:

Five types of shrimp are caught in Alaskan waters. Their names and maximum sizes are: the northern pink, 6 1/2"; humpie, 4 3/4"; sidestripe, 8 1/2"; coonstripe, 8"; and spot, 11". All five species may be found in the same areas, but at varying depths and over different bottom types.

Shrimp can be caught with pots but most commercial operations use huge otter trawls anywhere from 70 to 130 feet long. The net is held open by two huge doors. The Bureau of Commercial Fisheries is developing a trawl which separates bottom-dwelling creatures from shrimp while fishing. Otherwise, tremendous numbers of fish, invertebrates and debris are mixed with the shrimp. This not only costs the shrimp fishermen and women sorting time, but also disrupts the ocean food web as many of these small creatures are food for--or the young of--fish caught in other fisheries.

In Alaska, a large boat (70-80 feet

long) may catch as much as 30-40,000 pounds of shrimp a day. They are rinsed and then shoveled into the hold where they are mixed with crushed ice. Because of the perishability of their catch, shrimp fishermen and women usually fish within 12 hours of their home port. Kodiak is the center of shrimp fishing on the Pacific coast, though the bulk of U.S.-caught shrimp comes from the Gulf of Mexico and the waters off the south Atlantic states.

Three types of crab are caught in Alaska: king, Dungeness and tanner or snow crab. Both shrimp and crab depend on shallow near-shore waters and estuaries for mating and rearing of their young. (See the Sea Week Curriculum Series Volume 1 for descriptions and further information on both crabs and shrimp and Tidelines "Wanted: Information on the whereabouts of Pandalis borealis, alias Pink Shrimp," Vol. 1, #5, Feb. 1979, for information on shrimp or get a set of the Sea Grant life cycle posters listed in the bibliography.)

Dungeness are fished in small round pots approximately 30 inches in diameter, 12 inches high, and covered with stainless steel mesh. The pots weigh about 80 pounds each. King and tanner crab are fished with rectangular seven-by-seven-by-four-foot steel pots with nylon or steel webbing. These pots weigh 500 to 700 pounds and more when they're filled with crab. In both types of pots, crabs enter through a webbed tunnel to get at such bait as dead herring, squid, or fish heads. The pots are attached by a line (rope) to a float at the water's surface. The lines may be 600 to 1,000 feet long for the king crab fishery.

Fishermen use large, stable boats for crabbing because of often foul weather and because they need storage room for all the pots and the huge seawater tanks used to keep the crabs alive. The profits in crab fishing can be tremendous but so can the risks. Alaska's crab seasons are open in the winter when ocean storms are at their worst. Boats can ice up, or go down and crew members can be washed overboard in heavy seas or hit by the heavy crab pots as they are swung aboard. King crab are caught in the eastern Bering Sea and in the waters around Kodiak, Adak, Dutch Harbor, Sand Point, Cook Inlet, Prince William Sound and Southeast Alaska. (See Tidelines "Alaska's Scariest Fishery," Vol. II, No. 5, February 1980 for more information on the crab fishery.)

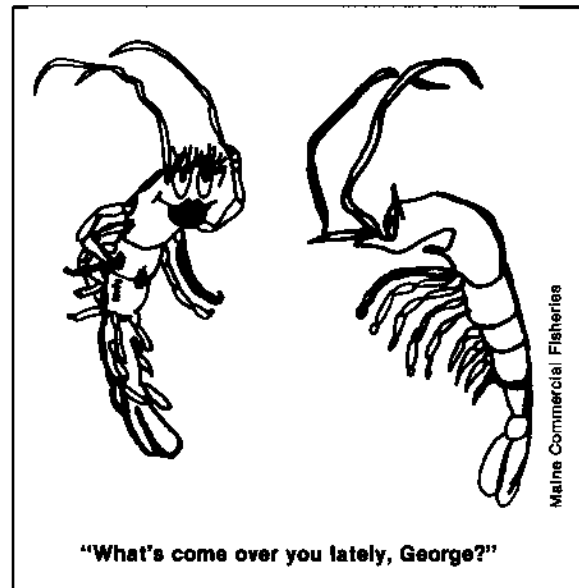
Basic shrimp and crab biology are known but there are many gaps in this knowledge. Populations seem to rise and plummet mysteriously. Such unpredictability has both biologists and members of the fishing industry worried. Overfishing and poor handling methods may be reasons for recent major declines in both shrimp and crab populations. For instance, while undersized and female crabs are supposed to be released to help keep the crab populations up, often they are frozen, stepped on or otherwise injured before being returned to the sea.

Yet, while it is true that crab and shrimp populations have declined in heavily fished areas, the populations also are down in areas where there has been no fishing at all.

Weather may be one factor. Changes of only a few degrees in water temperature can affect the

movements and developments of marine life. Shrimp, for instance, spawn earlier and carry their eggs longer when the water is cold. And if it's too cold, they have trouble keeping their eggs.

On the other hand, when the water is warm, shrimp grow faster and mature earlier. Speeding up the growth rate like this might throw off the balance of males and



females needed for a healthy population, because most shrimp species begin life as males and then transform into females when they are three or four years old.

Water temperatures have been warmer lately in both the Bering Sea and the Gulf of Alaska. The increases might have resulted not only in changes in shellfish reproduction, but also the movements of pollock, cod, halibut and salmon, all of which eat young shellfish. Supporting this theory is the fact that the numbers of such fish have been much higher lately in traditional shellfish waters.

(Background information for this activity is from Alaska Tidelines, The North Pacific Deckhand's and

Alaska Cannery Worker's Handbook
by John Higgins, and from Chuck
Parsons, Homer.)

Vocabulary:

NOTE: The plural of crab is "crab" when referring to marine animals of the same species, but "crabs" when referring to more than one species.

- shrimper
- crabber
- trawler
- king
- tanner
- Dungeness
- coonstripe
- sidestripe
- humpie
- spot
- northern pink

Materials:

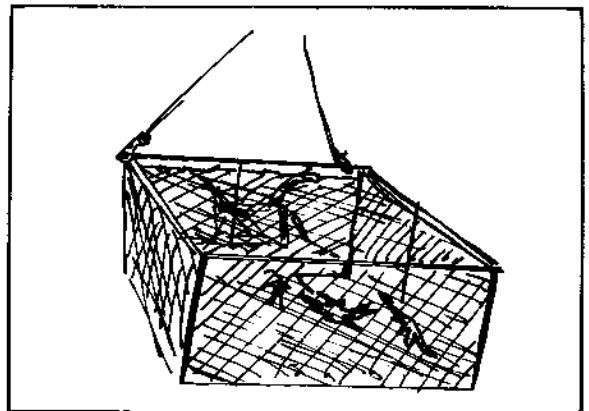
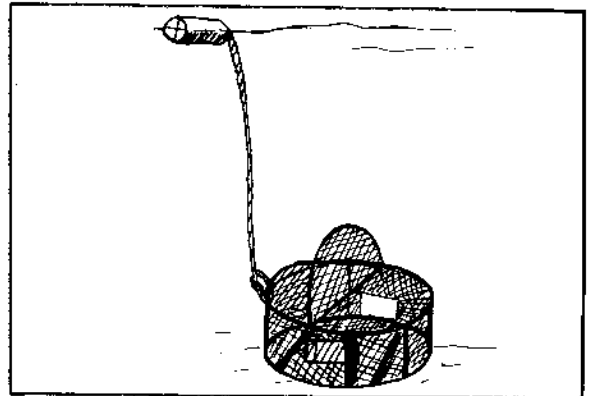
- scissors
- tape
- thin felt-tip markers
- small balloons
- small dowling
- knife
- thread
- needles
- copy of the WANTED poster (see background)
- person who fishes crab or shrimp
- worksheet:
 - ...Trawl and Pots (4H)
 - ...Shrimp and Crab Matching (4I)

Procedure:

1. Ask students what they know about shrimp and crab fishing. Mention that even though shrimp and crabs are not fish, they are part of the fishery. Familiarize students with the workings of a shrimp trawler (which hauls a big

net through the water) and a crabber (which drops pots at set intervals). Small shrimp boats haul the net in over the side, while large boats bring it in over the stern. Crabbers have to be careful not to lose their pots in strong tides and currents. Distribute the worksheet Trawl and Pots. Explain that the trawl is 70 to 130 feet long; the king crab pot is seven-by-seven-by-four feet, and the Dungeness pot, one-by-two-and-a-half feet.

2. Have students sketch netting for the trawl and the two pots with dark felt tip markers. The doors of the otter trawl should be a solid dark color. The frames (all the edges and fold lines) of the crab pots should be a solid dark color.



3. Then have the students cut and tape their pots and tie on

lines (thread) and attach floats (small balloons for the king crab pots and short pieces of colored sticks for the Dungeness pots) to the crab pots. The students should write their initials on the crab pot floats to mark them as required by law. Plus, students need to punch holes in the bait cans so the crabs can smell what's in there.

4. Pass out the worksheet Shrimp and Crab Matching so the students can catch something to put in their traps! Have them match the pictures with the descriptions. They may need the WANTED poster on the next page to locate the parts of the shrimp that are mentioned. (Answers: 1: king crab; 2: northern pink shrimp; 3: spot shrimp; 4: Dungeness crab; 5: humpie shrimp; 6: tanner or snow crab; 7: coonstripe shrimp; 8: sidestripe shrimp.)

5. Have students color the shrimp and crab, cut them out, and write their names on the back. Then they can put them in the proper traps: shrimp in the otter trawl; tanner and king in the king crab pot; and Dungeness in the Dungeness pot. Explain that some commercial fishers use special tanner crab pots

with openings just the right size for this smaller species to get into the pots. Others use king pots and put a board partially across the opening to keep kings out when king season is closed.

6. Discuss the difficulties that the shrimp and crab industry has had because of the mysteries of weather and biology. Show students the WANTED poster on the next page and explain some of the puzzles about crabs and shrimp mentioned in the teacher background. Students can do their part to help Alaska's future fisheries by always tossing back the young, females, and incidentally caught fish when they are out fishing. Invite a local shrimp or crab fisherman or woman to discuss these and other aspects of the fishery and to answer questions.

7. Be sure students know the sportfishing regulations on these species. Shrimp are often sport-fished in pots. Small crabs and females should be tossed back to provide for the next generation of fishing and eating!! (The female crab has a wide tail under which she broods her eggs.)

WANTED

first posted in *Tidelines*

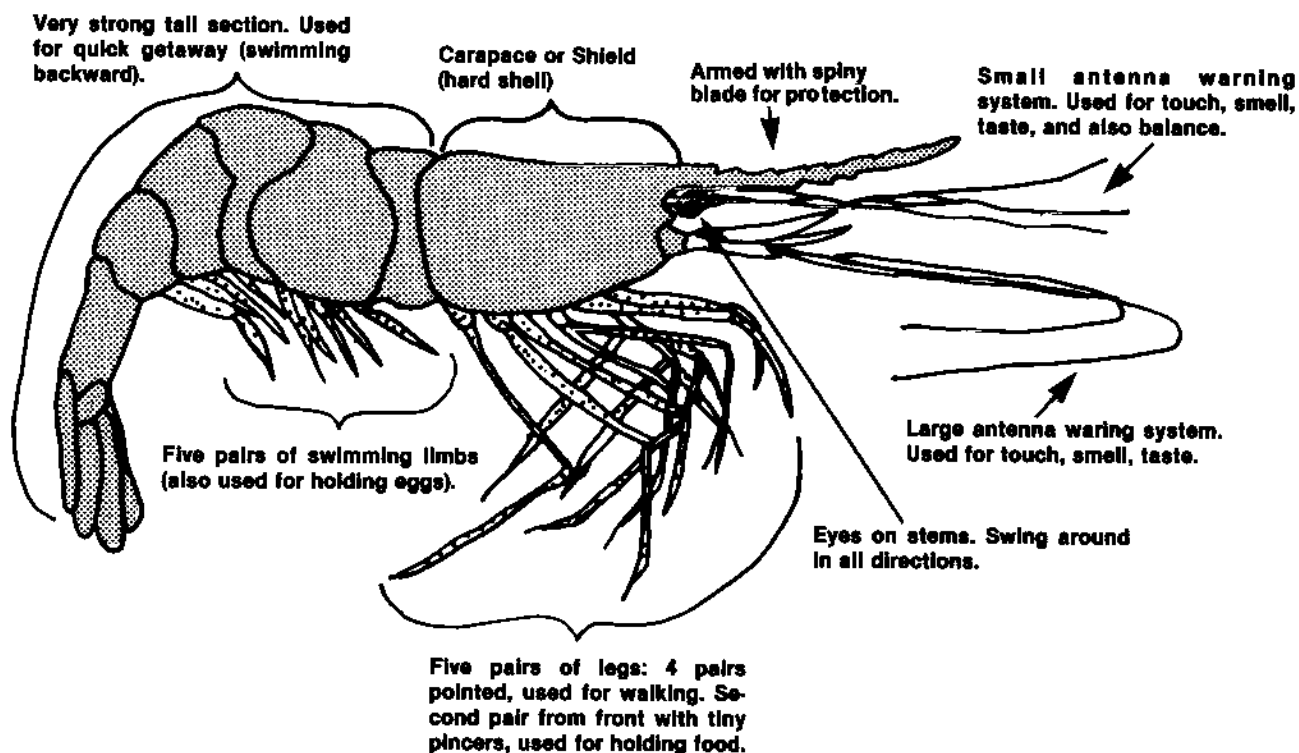
Information on the whereabouts of *Pandalus Borealis*,
alias pink shrimp

DESCRIPTION

Size: About 3-5 inches

Color: Pale Pink

Weight: 60-160 per pound



REWARD

ABOUT \$12 MILLION A YEAR FOR ALASKA FISHERMEN . . . MILLIONS MORE FOR ALASKA'S ECONOMY . . . AND MOUNTAINS OF FRESH SHRIMP SALAD FOR EVERYBODY.

Activity 10

Who Gets the Fish ?



Background:

Sometimes there is complaint about fishing regulations without recognition of the background issues behind them, and without realization that regulations can be changed if they really aren't for the best. The Alaska Board of Fisheries makes the regulations, but there are opportunities for public input.

Regulations are, in effect, allocation decisions governing the private uses of common property resources. In other words, the Board of Fisheries makes decisions about who gets the fish. Subsistence fishermen need fish for survival. Sport fishermen support many businesses by purchasing gear for recreational fishing; and commercial fishermen need fish in order to make a living, to keep canneries open, and to provide fish for people to eat. The issue of who gets the fish can become extremely complex.

To make those decisions, the seven-member Alaska Board of Fisheries is appointed by the governor and confirmed by the

legislature. In addition to the Board of Fisheries, there are local fisheries advisory boards (currently 68 of them), overlaid by six regional fishery councils. The Alaska Department of Fish and Game is charged with providing management data and information to the board. The Fish and Wildlife Protection Division of the Alaska Department of Public Safety (which also includes the State Troopers) enforces the regulations.

The increasing competition for limited fishery resources has resulted in frequent litigation, which also affects regulations. The Board of Fisheries also works with the North Pacific Fisheries Management Council which is a federally mandated advisory group responsible for fisheries between three and 200 miles offshore (outside state waters).

Individual citizens can make recommendations to the various boards and agencies, either privately or during regularly scheduled meetings and hearings.

The strength of the Alaska Board of Fisheries is in its being a public forum through which diverse input and scrutiny serve as crosschecks between competing viewpoints. The board is accessible to your students, along with all other Alaska residents. Many of the board's decisions rest not only on management data, but also on the quality of public participation.

Vocabulary:

- regulations
- Board of Fisheries
- advisory council
- litigation
- common property resource

Materials:

- copies of fishing regulations
- member of local Fish and Game Advisory Committee
- Fish and Wildlife Protection Officer

Procedure:

1. Ask students to name as many local fish regulations as they can. Then pass out copies of the fishing regulations (commercial, sport and/or subsistence). Add to the class list.
2. Invite a fish and wildlife protection officer to come to your class and talk about the challenges and rewards of enforcing regulations.
3. Invite a member of the local fish and game advisory committee to show to your class and share experiences or have students interview the committee member at home. Outline the procedure for changing a regulation.
 - a. A proposal is submitted to the local fish and game advisory committee (Committee members or fish and game employees can assist with proper wording.)
 - b. The advisory committee makes a recommendation on the proposal.
 - c. The regional council makes a recommendation on the proposal.
 - d. The Board of Fisheries acts on the proposal with input from the Alaska Department of Fish and Game, the Fish and

Wildlife Protection Division, and other agencies.

- e. A regulation adopted by the board is drafted into the proper format for publication and, after lengthy legal review, goes to the lieutenant governor for signing into law. The regulations become effective 30 days after the signing.

Remind students that they are welcome to go to any of these meetings and add their verbal input before a decision is made. Students also can go directly to the Board of Fisheries with their proposals.

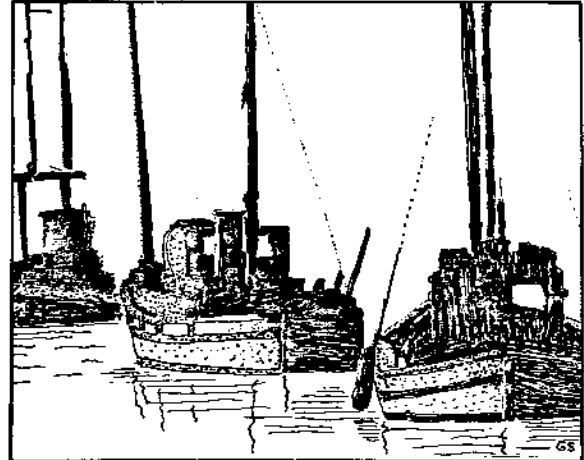
4. Ask the students if they can think of any regulations they would like to see changed. How would their proposal most likely be approved? The proposal should:
 - a. be well researched (The students might want to do their own scientific study to be sure the fish would benefit too!). Discuss the proposal with a fish and game biologist and a protection officer as well as other fishers. (Is the proposal biologically sound, reasonable, and enforceable?)
 - b. have local support (Generally but not always students should at least talk to someone with an opposing viewpoint to be sure they can respond to all the objections.).

- c. be well-worded.
- d. Have the support of the local advisory committee (generally but not always). Students should talk to each advisory committee member and attend a meeting ready to speak up in support of their proposal.
- e. Write letters about their proposal to the regional advisory committee and the Board of Fisheries.

Now come up with a proposal and give it a try. Good luck!

Activity 11

Harbor Field Trip



Background:

The harbor is the focal point of just about every coastal community. Good harbor sites are extremely valuable, and are usually the first coastal sites to be inhabited. The comings and goings of local boats as well as those from other states and nations add excitement and color. In fishing communities, the boats in the harbor often are worth more than the houses in town. Harbors offer tremendous learning opportunities and are often within walking distance from local schools.

Even for interior communities, local waterfronts bustle with boats and motors, and serve as sources of hunting and fishing stories and outdoor adventures. This activity focuses on harbors, but easily can be adapted to general waterfront studies along interior rivers.

Materials:

- notepads
- pencils
- binoculars
- life rings and ropes

- fisherman or woman
- harbor master or mistress
- worksheets:
 - ... Fishing (4J)
 - ... Harbor Investigation (4K)

Procedure:

1. Plan a field trip (preferably more than one) to your local harbor or waterfront.
2. Send home permission slips. Invite parents and local resource people to go with you or meet you at the harbor for a tour of their boat. Plan to divide your class into small groups, if possible, for part of the field trip. High school students involved in local fisheries could be good group leaders. All your assistants, in fact, will perform better with pre-trip preparation. Visit the harbor with your assistants ahead of time, if possible. Go over the two worksheets with them, reviewing the different types of fishing boats and ways to find invertebrates, birds, fish, mammals, and signs of environmental impact.
3. Pass out the worksheet Fishing Boats and have students label the pictures. (1: longlining; 2: halibut; 3: seining; 4: salmon (mainly pinks) or herring; 5: trolling; 6: salmon (kings and cohos); 7: trawling; 8: shrimp or whitefish (bottom-fish); 9: gillnetting; 10: salmon or herring; 11: crabbing; 12: king and tanner crab.) Then go over the worksheet Harbor Investigation and talk about the answers you might expect. Binoculars might help in identifying birds and mam-

mals. Tell students to look carefully for seaweeds and invertebrates under the dock, on the sides of pilings, inside old tires hanging down for bumpers, and on lines (ropes) hanging down in the water. For a sure way to find invertebrates, several days (or the day before) your field trip--put aged meat, entrails, or a baited crab pot (in season) into the water.

Typical environmental problems include oil and gas spills, litter, dog droppings, sewage, garbage seepage from a landfill, and fish gurry or crab wastes from a cannery. The class might want to interview a fisherman or woman and the harbor master or mistress as a group. Go over the questions students might ask about the harbor's past, present and future; fishing techniques; fishing boats and gear; problems of harbor management; fishing and harbor adventures. Have the students take notepads and pencils so they can jot down quick notes for writing a story later. Students may want to take cameras, plankton nets, and secchi disks, as well. (For more information on plankton nets and secchi disks, see Unit 3, Activity 3.)

4. Go over safety procedures and take a life ring and rope with you. Have each student practice throwing it beforehand.
 - Use the buddy system.
 - Stay together.

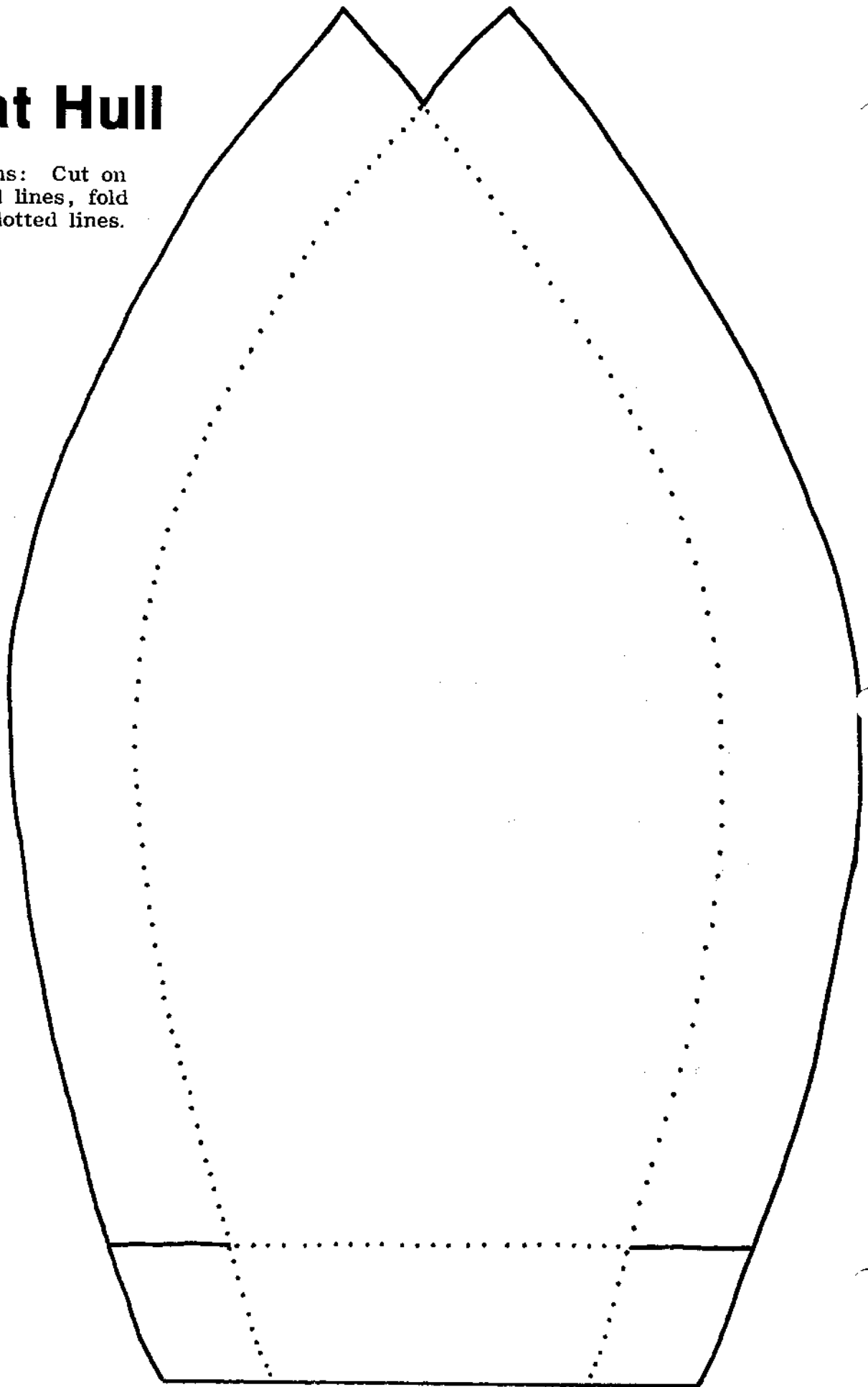
- If someone falls in, yell for help, toss a life ring or oar, launch a rowboat but don't go in the water yourself.
5. Plan follow-up activities. If you have only one chance to go to the harbor, you may want to do some of the activities in the next unit, Life on the Seas and Rivers, before you go.
 6. Enjoy your trip to the harbor!
 7. Follow up by having students write stories from their interviews for the school or community paper. Go over pointers for newspaper journalism:
 - Have a strong lead-in (interesting but true statement).
 - Tell what's happening (the "five Ws" are Who, What, When, Why, Where) in the first paragraph.
 - Go over other story events in succeeding paragraphs.
 - Remember, quotes make your story lively and interesting.

Additional Activities:

1. Art, Science: Have students make model fishing boats out of paper. Assemble soda straws, spools of thread (for reels), needles, old nylon stockings (for nets), felt-tip markers, scissors, construction paper. A sample hull cutout is enclosed. As the hull is folded down and the bow and stern are taped to the sides, the boat assumes an arched deck. (There is no bottom to the hull!) Students can create paper boxes for pilot houses and use the soda straws for masts, outriggers, cross-ties, stove pipes, or the center of reels and winches. Anything added to the pilot house should be done before the pilot house is taped to the deck. Felt-tip markers can be used to show port holes, scuppers, and other detail, plus to add the boat's name. (Activity developed by Bill Hastie, Marine Education Consultant, Oregon Department of Education)
2. Art, Science, Language Arts: Have students make charts comparing different types of sport, commercial and subsistence fishing boats. They can either draw the boats or cut pictures out of fishing magazines or catalogs.

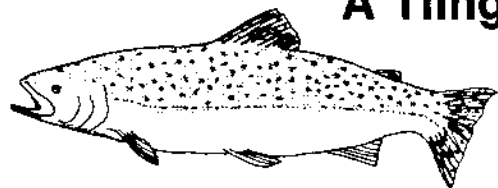
Boat Hull

Directions: Cut on
the solid lines, fold
on the dotted lines.



How the Fish Came Into the Sea

A Tlingit Myth



After Raven bring daylight to all the people he keep walkin' north, lookin' around, he keep going up, up north. And he see something big, big just like a scow way out on the sea, like a floating box, and he ask:

"What is it out there?"

"That's a tank. All different kinds of fish in there. They try to keep them in there so there's no fish going around this ocean."

Well, he's thinkin' about it, how he's gonna get it. Raven send that black and white bird with the long tail - the magpie - to go up and cut a cane for him, and he fix it like octopus finger, he carve it like two tentacles of the octopus. He's gonna try to drag in that big scow with it, no matter how far off a thing is, that octopus finger cane will always reach it.

In the evening Raven got all the peoples together and they beat drums. He hold the cane in his hands and move it around, going up, going down, going around, testing it. All right. That woman said she's satisfied with it. Then he get all the peoples down on the beach and they begin to sing, and he start to hook it, he tried to pull that thing ashore. And he tried again.

"OOH, OOH, OOH, OH, OH!"

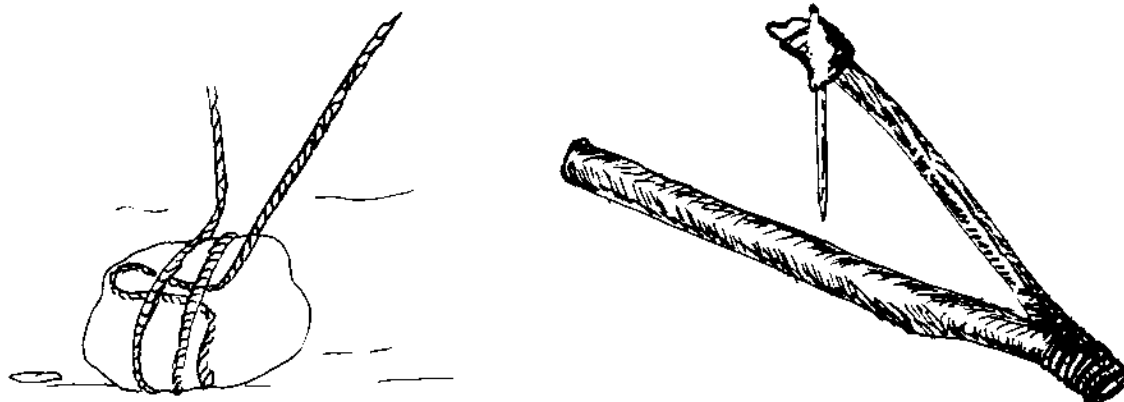
Saying to the people "Sing stronger all the time" and he tried again.

And he begin to draw it in to shore little by little. Finally, he pull it onto the beach and he jump inside, and he open each door. He open the doors for smelts (fish, small fish) and the smelts comes out from that tank. After that herrings, and oolichons, and out of the other sides, king salmon first, and humpies, and coho, and later on the one they call the fall fish, dog salmon, and last comes the ones that stop, the halibut and flounders and cod, and he pushed them out.

See, just the way he opened the doors, is just the way they come every year. No mistake on it. And Raven was satisfied, he released all that fish to go around the world.

Told by Billy Wilson, Sr., of Hoonah, Alaska.

Halibut Hooks

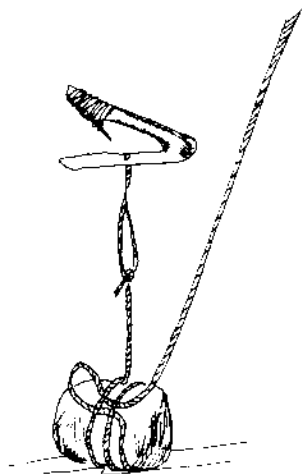


Long before they knew about steel, from which modern fish-hooks are made, Indians of the Pacific Northwest coast made hooks out of wood and bone. One of the special hooks was, and still is, the halibut hook. It often includes a carefully carved design that encourages a spirit helper to aid in catching the halibut.

The halibut hook is made of two pieces of wood. The lower part of the hook with the design, is often made of yew, a wood that gets harder as it ages. The top piece of the hook is usually made of yellow cedar. The cedar must not have knots in it and should be aged as much as a year before it is used.

A halibut hook may take several hours or days to make. Much of the time goes into carefully carving the piece of yew. When the cedar piece of the hook has been shaped, it is fitted with a hook, which traditionally was a piece of sharpened bone lashed to the cedar with strips of rawhide or split roots. Today a nail may be used instead of bone. The hook parts should be shaped so that when they are placed together three fingers will fit between the widest part of the opening between the two parts. There should be a thumb-width between the tip of the bone or nail and the piece of yew. By drawing an imaginary line along the bone or nail and extending it to the piece of yew, the maker knows where to drill the hole through which he will put the line. The finished halibut hook is usually about 8 inches long. Before the invention of nylon and other modern fishing lines, the hook was attached to lines made of natural materials such as strips of cedar bark, kelp stems and rawhide.

To use a halibut hook, the hook must first be baited with octopus, herring or some other meat. The bait should be wrapped over the top of the hook and around the bone or nail point so it doesn't show.



The fisherman wants the hook to float just off bottom, so a weight is attached to the line a short distance from the hook. Sometimes fishermen use rocks for weights. The rocks are tied in such a way that they will hold the hook near the bottom, but can be released by a tug on the line. In that way the fisherman does not have to pull up the rock as well as the fish. From the weight, the line goes up to a float. After the hook and weight are dropped down, the float attached to the line stays on the surface so the hook can always be located.

The fisherman chooses a favorite spot in which to set his hook. Knowing where halibut may be found takes years of fishing experience.

Halibut swim along the bottom, and they are not very fussy about what they eat. When a fish sees the baited halibut hook, it opens its mouth wide. The lower sides of the mouth slide between the two pieces of the hook and when the fish tries to spit out the hook because it cannot be swallowed, the bone or nail point catches onto the fish and it is hooked!

Questions:

1. What kinds of wood are preferred for making halibut hooks?

2. What is used for the point that will actually catch the fish?

3. Before the use of nylon or other line, what natural materials might have been used to make the line for the halibut hook?

4. What was used as a weight or sinker? _____
5. What do you think might have been used for a float?

6. What is used for bait on the halibut hook?

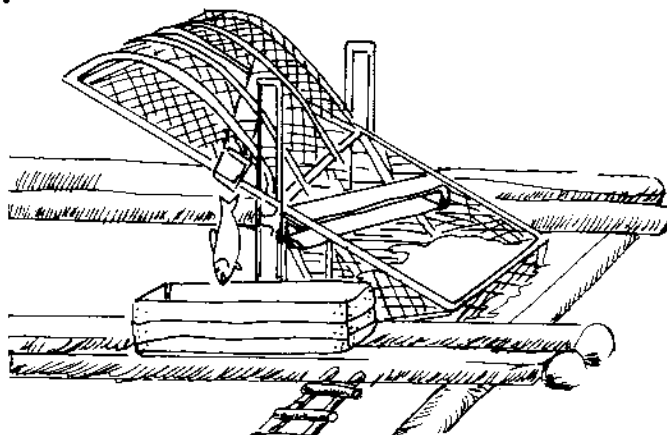
7. Why was one side of the halibut hook often carved?

8. How long does it take to make a halibut hook?

9. Now, try to make your own halibut hook!

Fish Wheels

Fish wheels are an old, old idea that didn't originate in Alaska. No one knows for sure where the first fish wheels were used but it may have been in China several hundred years ago. Fish wheels were first used in the United States in the 1800s. After being introduced in the Eastern states, they were tried in other parts of the country. Around 1900, a fish wheel was used for the first time in Alaska, on the Tanana River.



Fish wheels have various shapes and sizes, but the typical Alaskan fish wheel is a large structure mounted between log rafts. It usually has two baskets, but sometimes may have three. A board chute is on the side of the basket nearest the axle of the fish wheel. On the side of the log raft is a storage box for fish.

The fish wheel is powered by the river's current. The force of the current against the paddles of the fish wheel causes the wheel to turn slowly. Fish moving upstream are caught in the scoop-like baskets as they swim upstream. Then, the fish are carried upward, out of the water, by the basket. As the wheel once again starts downward toward the water, the fish slides out of the slanted chute at the bottom of the basket and falls into the storage box. The fish wheel is so cleverly constructed that it can catch fish and place them in storage without using any energy except that of the passing water. The wheel doesn't need anyone to run it, except for occasional checking to remove fish from the storage box.

The fish wheel is anchored to the bank of the river with cables. Sometimes a boardwalk is built from the fish wheel to shore so the owner can walk to the wheel, but othertimes a skiff is used to get from shore to the wheel.

Fish wheels in Alaska are used both by people who catch fish to use themselves and by people who want to sell them.

Fish wheels are used today on the Yukon, Tanana, Kuskokwim and Copper Rivers.

Answer these questions:

1. How long have fish wheels been used in Alaska?

2. What turns the fish wheel?

3. How does the fish wheel catch a fish?

4. Where are the fish kept after they are caught?

5. Fish wheels may be used for subsistence fishing. How else may they be used?

6. In Alaska, fish wheels are only used today on four large rivers. Which rivers are these?

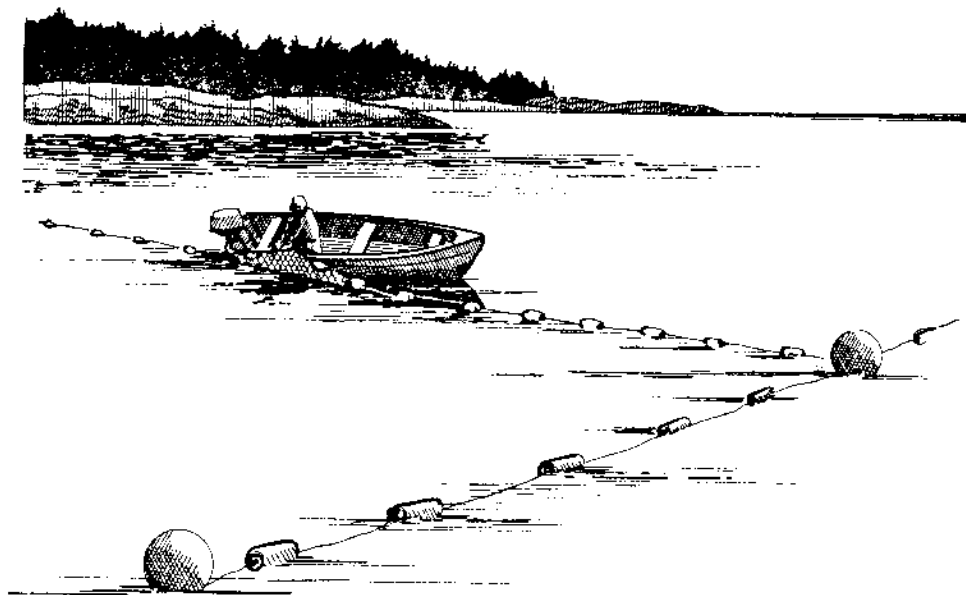
7. Draw a map of Alaska showing these rivers and your hometown.

Gillnetting

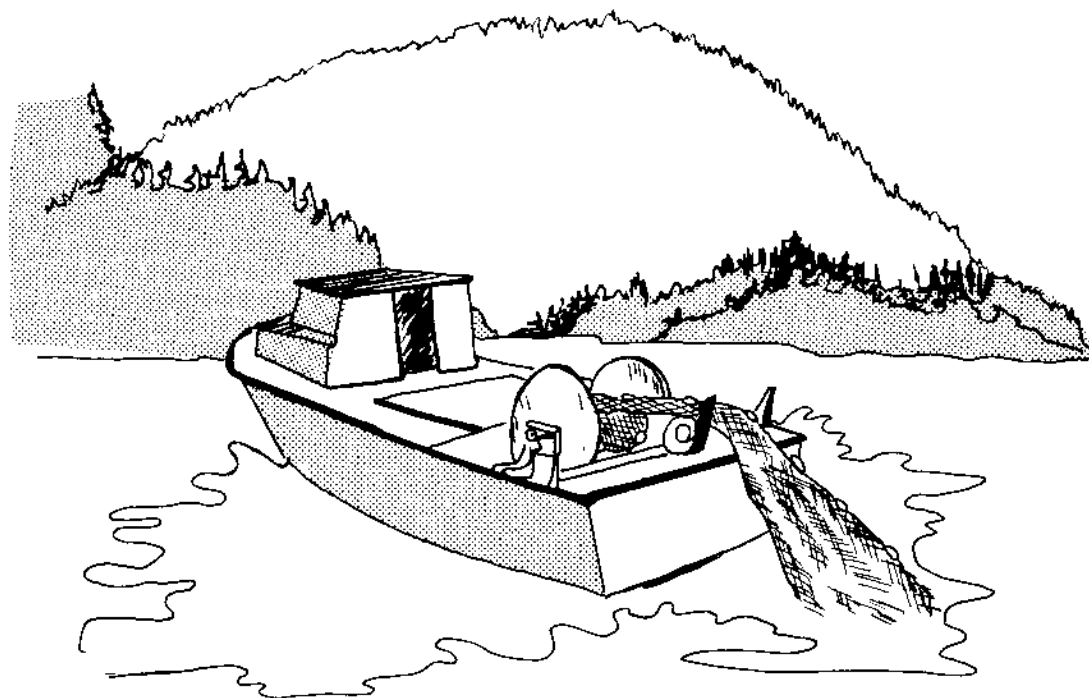
Gillnetting is carried out in just about every coastal area of the state where there are salmon. Gillnets are also used to catch herring.

The gill net is composed of mesh large enough for a fish to poke its head through but small enough to catch the fish behind its gill covers. Different size meshes are used for different fish species. Mesh size plus the length and width of the gill net are regulated by laws which vary in different areas. The gill net has a line with cork floats at its top edge (to make the top of the net float) and a line with a lead core or lead weights on the bottom edge (to make the bottom of the net sink).

Gill nets are used in two ways in Alaska. Setnetting, or set gillnetting as it is also called, means anchoring a gill net to shore at one end and anchoring it out in the water at its other end. The set net is fixed, or set, in its location for as long as its owners want or are allowed to leave it to catch fish.



Set nets are used in many coastal areas of Alaska. Set net sites are valued family possessions. Sometimes a site has been used by one family for several generations. Today, each set net must show the official registration number assigned to it. Set nets are often tended by families who move to summer camps or cabins near their net sites and spend the summer season tending one or more set nets. Some set net fishermen or women pick fish out of the nets only when the tide is at its lowest, but others use skiffs to check their nets often.



Drift gillnetting, in contrast, means using a fishing boat, called a gillnetter, and letting the net drift free while the boat's crew keeps constant watch.

Like setnetting, the drift gillnetter sets his nets as close to shore as possible because when salmon are migrating toward their spawning grounds, they usually move along the beach. The gillnetter usually tries to move the boat close to shore before dropping the large float that is attached to one end of the net overboard. As the boat moves away from shore, the gill net is carefully let out behind the boat. When the whole length of the net has been released into the water, another buoy is attached to the other end of the net and the boat pulls free. The gillnetter lets the net drift and fish for several hours, trying to keep the net in a straight line. To do this, the fishermen sometimes attaches the end of the net to the boat which then pulls against the net to straighten it.

When it is time to pull the net aboard, the buoy and one net end are picked up and the net is hauled. In many areas of the state, the typical gillnet boat has a power operated reel on its deck to pull in the net. Boats are called bowpickers or sternpickers depending on whether the net is picked up at the bow or the stern of the boat. Fishermen stand between the reel and the end of the boat and pull fish out of the net as it comes on board. In Bristol Bay, however, a gill-netter may catch a great many fish in a short time. So Bristol Bay drift gillnetters often use power rollers to bring portions of the whole net aboard to take fish from the nets.

Questions to answer about gillnetting:

1. What are the two kinds of gillnetting found in Alaska?
_____ and _____
2. Gill nets may be as much as 1,200 feet long. They are often measured in fathoms. A fathom is equal to 6 feet. How many fathoms long is a gill net that is 1,200 feet long?

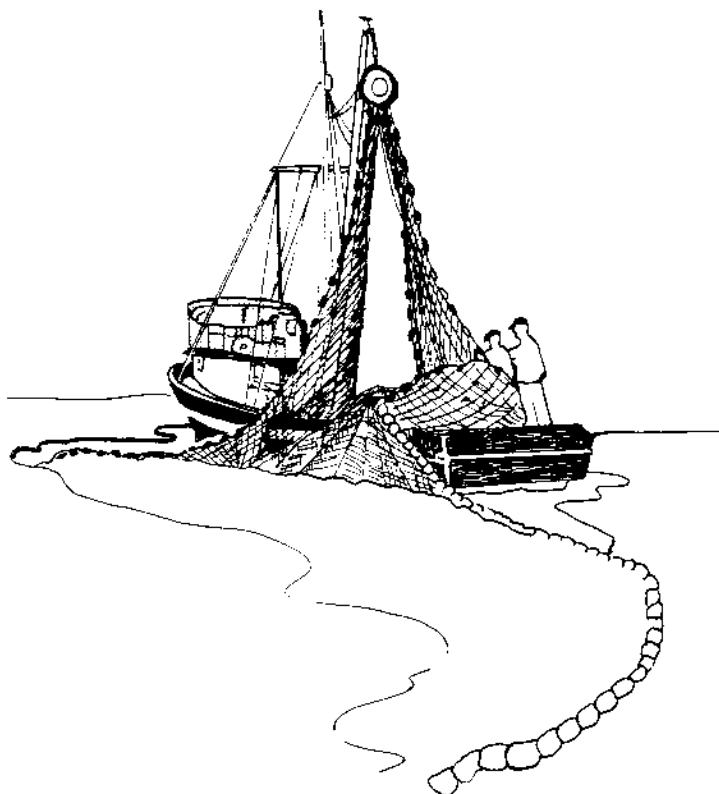
3. If the gill net is 36 feet deep, how many fathoms deep is it? _____
4. What do bobbing corks mean? _____
5. Which kind of gillnetting requires a larger boat?

6. Why are the nets used in this kind of fishing called gill nets?

7. What's the difference between a bowpicker and a stern-picker?

Purse Seining

Many kinds and sizes of boats are used to fish for salmon and herring in Alaska. Among the largest boats are the purse seiners, which can measure up to 58 feet long.



The seiner can be recognized by certain special features. Alaska seiners have a long boom that forms a "v" with the mast of the boat. Hanging from the tip of the boom is a power block that looks like a large pulley. If the seiner is not fishing when you see it, it may have a huge pile of net called a purse seine on the deck. Resting on the deck or being pulled behind the seiner will be a small boat called a seine skiff or jitney.

Seiners usually catch pink salmon, but they may catch other kinds of salmon or herring. The seiner's captain has the responsibility of deciding where the nets will be put out, or set. In making this decision, the captain relies on his knowledge of where the fish have been in the past, as well as currents and tides. Now days, the captain also depends on a recording fathometer, an instrument that makes small black marks on paper if fish are in the water beneath his boat.

When a fishing location has been selected, the boat lays the net, while the jitney holds the end of the net. The purse seine may be held out for a time in a huge "u" shape. Then the jitney and the seiner head toward each other until they meet, and the seine net is pulled into a big circle. Deckhands use power equipment to pull lines that close off,

or purse, the net at the bottom. Thus, all the fish surrounded by the net are trapped and can be hauled onboard.

If the catch is small enough to handle, the crew members haul the net on deck using the power block. As they do so, one person stacks the cork line (the top line of the net which has floats to hold it at the surface of the water while it is fishing). One more people pile up the purse seine webbing, and another person stacks up the lead line (the bottom line of the purse seine containing weights, or lead, to help stretch the fishing net tight from top to bottom).

If the catch is large, a big power-operated dip net, called a brailer, is used to scoop the load out of the closed net.

Purse seine crews usually include three to five people, plus the captain.

Answer these questions:

1. In purse seining, what is the job of the jitneyman and jitney?

2. How does a seiner captain decide where to set the net?

3. What is a cork line?

4. What is a lead line?

5. What does the power block help fishermen do?

6. What do fishermen do if there are too many fish in the net for them to haul it up?

7. How many people are usually used to run a seine boat?

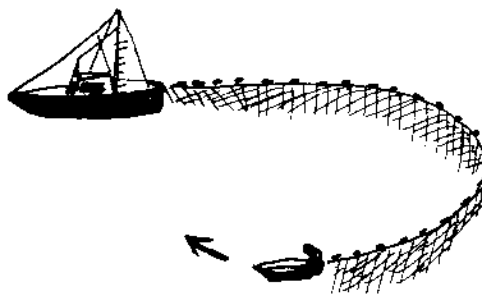
8. a. If you were a purse seiner and you caught 172 pinks and 5 reds in your first set. Assume each pink weights 3 pounds and each red weighs 6 pounds and that you would get \$.30 per pound for pinks and \$.85 per pound for reds. How much would they be worth? _____

b. Now figure how much you as a crew member would make for that set, or haul, assuming your crew share is 11 percent. _____

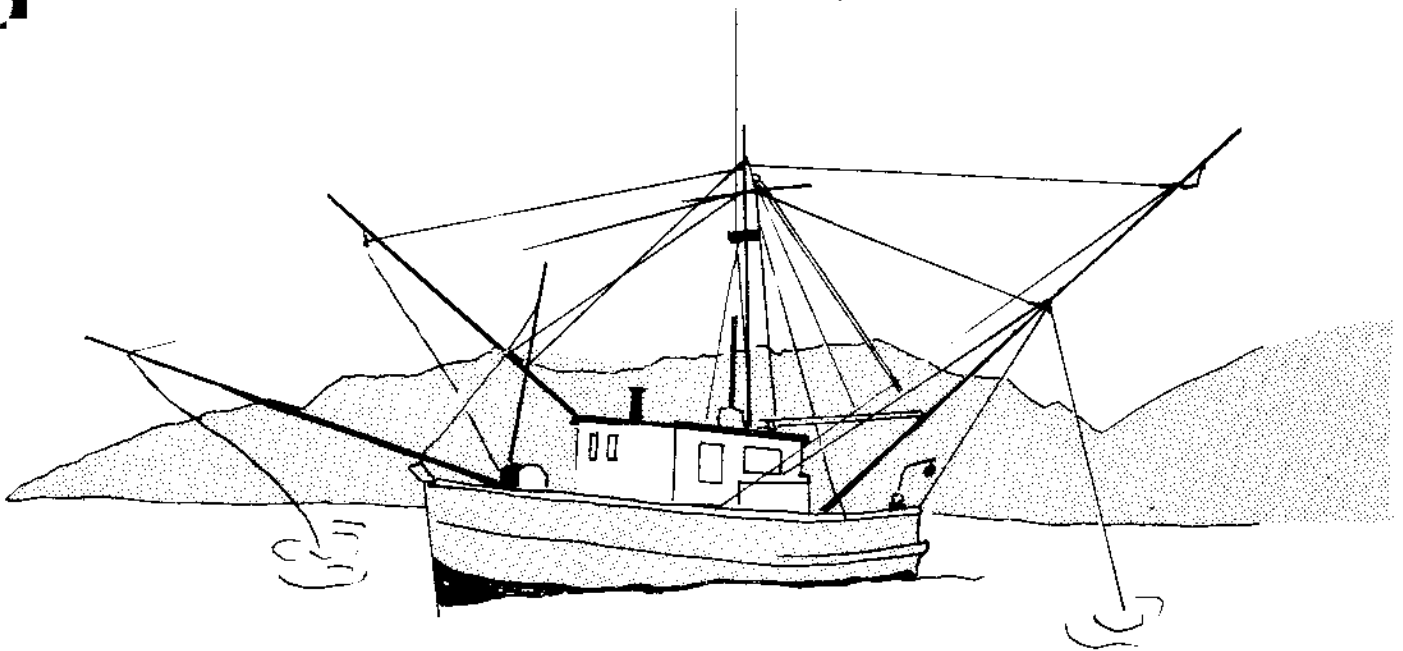
c. In your second set, you caught 250 pinks and 8 red. How much would they be worth? _____

d. What is your crew share (11%) for this set?

e. What is your total crew share for those two sets?



Trolling



Trollers are the only commercial salmon fishermen and women who do not use nets. Their fishing is done with poles, lines and hooks. In many ways, the troller's fishing gear is like the fishing poles, hooks and lines used by sport fishermen. But trolling gear is larger, stouter and more complicated.

Boats used by trollers may be any size, shape or color and may range from less than 20 feet long to more than 60 feet long. Many of the boats look as if they were built for fishing but other trollers may be converted pleasure cruisers. Whatever they look like, though, all trollers, as the boats are called, have one or two pairs of long, tall poles.

Every troller has one set of main poles that are as tall as the boat is long. The main poles often are attached to either side of the boat, just behind the cabin by a hinge, so when they are not needed, they can be pulled up until they stick straight up into the air. When they are needed for fishing, the main poles are lowered to form about a 45 degree angle with the mast. In Alaska if the troller has a second set of poles, they are usually "bow" poles, attached to the boat ahead of the cabin.

When fishing, the troller usually stands in a large pit at the stern of the fishing boat. Steel fishing lines run off of large brass reels called gurdies. Short nylon line is used to attach the hook or bait to the steel line. For bait the troller may use herring or artificial bait such as flashers (shiny pieces of metal that look like small fish to salmon). The troller checks often for damaged or missing bait and to see if any fish have been caught.

Compared to the numbers of fish caught by gill-netters or purse seiners, the troller's catch is small, but the value and quality of the fish is high. Trollers usually catch kings and cohos, the two species of salmon most highly regarded for fresh eating. That, and the fact that the troller carefully handles, cleans and chills each fish as it is caught, gives the troller's catch a higher value, fish for fish.

Trollers are allowed to fish in Alaska from Ketchikan to Yakutat. Like the other fisheries, trolling is controlled by regulations that come mainly from the Alaska Board of Fisheries. Two federal agencies, the North Pacific Fisheries Management Council and the National Marine Fisheries Service, regulate trolling that is done more than three miles off Alaska's coast.

Now answer these questions:

1. How would you recognize a troller (the boat) if you saw it?

2. How is the method of catching salmon used by trollers different from that used by gill-netters and purse seiners?

3. What are the two kinds of salmon that trollers usually catch?

4. What are the brass fishing reels called?

5. Where in Alaska might you see a trolling boat?

6. Locate Ketchikan and Yakutat on a map of Alaska. How many miles (as the crow flies) can be fished between these two towns?

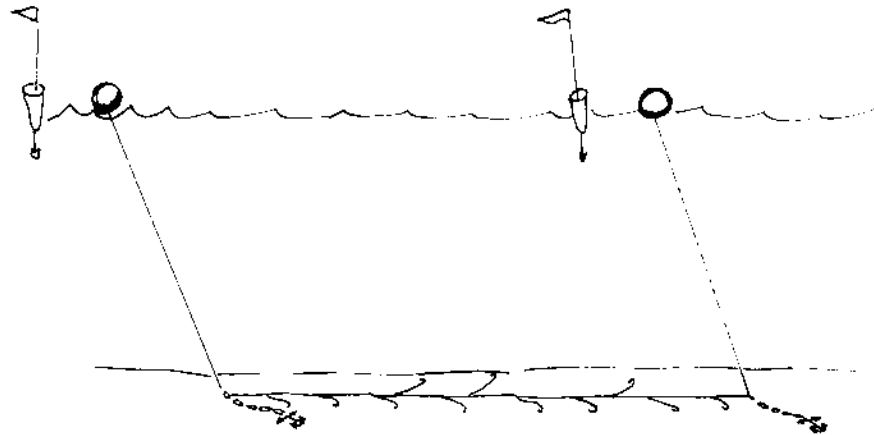
7. In what two ways is the word "troller" used?

8. a. If you were trolling and caught 5 king salmon (averaging 20 lbs @ \$2.25 per lb) and 52 coho (averaging 7 lbs @ \$1.30 per lb), how much would your day's catch be worth?

- b. If you caught 2 kings and 40 coho, how much would your catch be worth?

- c. If you caught 7 kings and 21 coho, how much would your catch be worth?

Longlining



Longlining is a fishing method used in Alaska to catch halibut and other fish that live on the ocean floor. The Japanese longline for tuna, swordfish and sharks.

Longlining means using a long line with hooks on it and dropping one end of the line down to the ocean floor so it will catch fish. Longline gear used to catch halibut is made up of lengths called skates, which usually are 300 fathoms (1,800 feet) long. The main part of the skate is the strong nylon groundline. At regular intervals along the groundline, often every 26 feet, longliners attach a short line and a hook. These short lines and their hooks are called gangions (pronounced gan-yons).

When the crew members on a longliner are getting ready to set out their gear, they first bait the many hooks of the gangions. Sometimes machines are used to do the baiting but more often it must be done by hand. Herring, codfish or sablefish may be used as bait, but octopus is the favorite since it is tougher and lasts longer than the others.

When a halibut boat is setting gear, it must be moving steadily through the water. First a 17-foot long pole, with a flag and a flashing light at the upper end and a combination of weights and buoys at the other, goes overboard. The pole will stand upright in the water and will mark the location of the longline gear so the crew can find it later. Attached to the pole is a large float, or buoy, which will support one end of the longline. Overboard with the buoy goes the first of the buoy line that connects the buoy to the baited skate, or skates. When the buoy line is clear, an anchor is pushed overboard. The anchor quickly sinks to the bottom and will hold the groundline and the gangions along the bottom. As the boat moves along, groundline and gangions go overboard until the whole length of line is out. A boat may put out just one skate at a time or several

skates may be strung end to end to form one line that is as much as two or three miles long. At the end of the string of gear, another anchor, buoy line, buoy and pole are put overboard.

After one string of longline gear has been set out, the crew on the halibut boat put out another string, and another. Often it is not long after the last string is set that the crew must go back to the first string and pull it aboard. Usually the gear is left to fish for about 24 hours, then poles, buoys, anchors, lines and fish must be hauled aboard the fishing boat.

When the gear is pulled, a reel like a gill net reel may be used to wind the groundline. On some boats, however, the line is pulled without using a reel. As the fish start to come aboard, caution must be used. Halibut are often larger than 100 pounds and may weigh more than 400 pounds. They are very strong, and just a tail flick from a large fish can break bones. Fish are brought aboard with gaffs and then must be cleaned and carefully packed in ice in the hold.

A boat rigged for longlining is distinctive and can be spotted by its bundle of tall poles with flags and lights on them. Long-lining can be done from boats of any size. Some longliners have reels for winding the groundline while other don't. Many large longliners have a "shed" at the stern in which to store all the lines, hooks and other gear, and to shelter crew members as they bait and rebait hundreds of hooks each day.

Questions to answer about long-lining:

1. In Alaska, what is the main kind of fish caught by longlining?

2. What other kinds of fish are also caught by longlining?

3. What is a length of longline gear called?

4. Along the groundline of the halibut gear, crew members attach leaders and the hooks that will catch the fish. What is the name that longliners use for the leaders and hooks?

5. Longline crew set out their strings of fishing gear. Then they leave them and go off to set out more gear. What do they put at each end of a string of gear so they can come back and find it later?

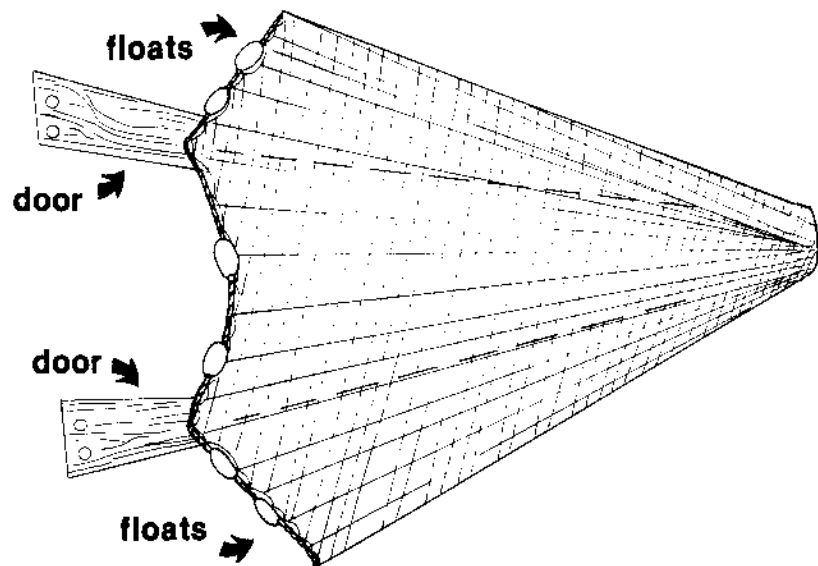
6. Why do you think longliners put an anchor at each end of the string of fishing gear?

7. Why are halibut dangerous fish to bring aboard a boat?

8. How might you recognize a boat that is outfitted for longlining?

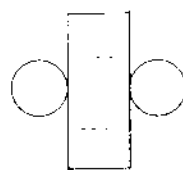
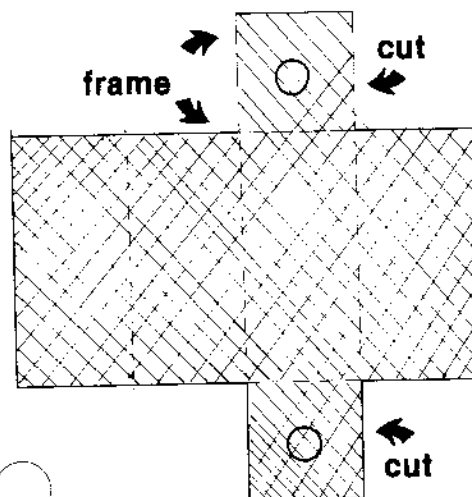
Trawl and Pots

Directions: Cut out these paper models on the heavy black lines and tape them together.

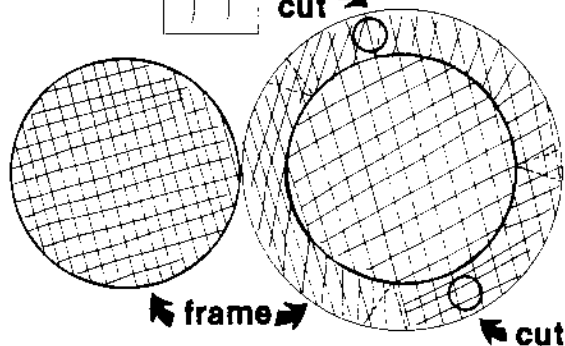
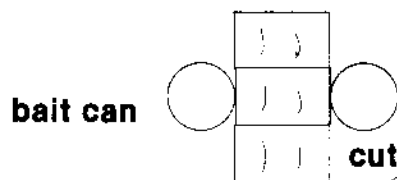


Otter Trawl

King Crab Pot



bait can

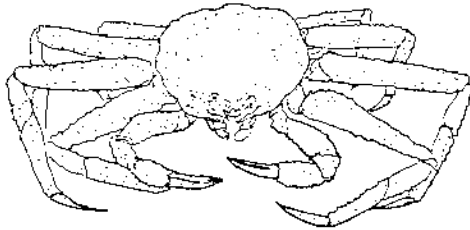


Dungeness Pot

Shrimp and Crab Matching

Directions: Write the name of the crab or shrimp next to the description.

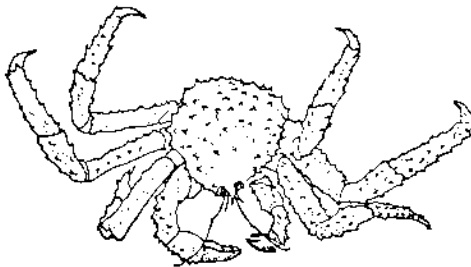
tanner or snow



sidestripe



king



humpy



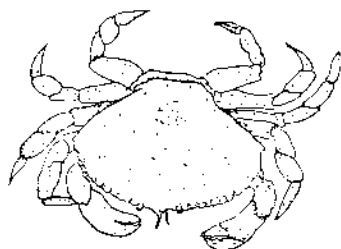
_____ 1. Thick shell with large round sharp spines; right claw larger than left claw; three pairs of walking legs jointed to bend towards the back of the body.

_____ 2. Third segment of tail section is partially ridged and has two spines one in front of the other on the back of that segment; pale pink color; maximum size 6½ inches.

_____ 3. Third segment of tail section not ridged and no lobes or spines on the back of that segment; dorsal spines only on the front half of the carapace or shield; maximum size 11 inches.

_____ 4. Shell fairly smooth; walking legs (stretched out) short when compared to width of body shell; claws both the same size and short and heavy.

Dungeness



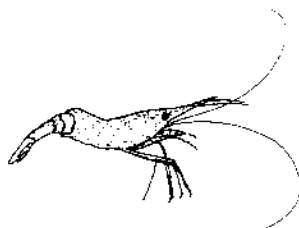
5. Third segment of tail section is partially ridged and has just one lobe or spine just in front of the back of that segment; maximum size 4 and 3/4 inches.

spot



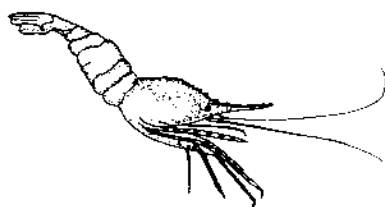
6. Shell fairly smooth; walking legs (stretched out) much longer than width of body shell; 4 pairs of walking legs jointed to bend towards the front of the body; claws slim and sharply pointed.

northern pink



7. Third segment of tail section not ridged and no lobes or spines on the back of that segment, dorsal spines on carapace (or shield) extend down the back past the halfway point; maximum size 8 inches.

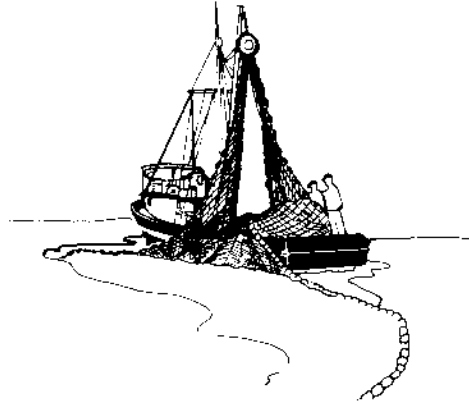
coon stripe



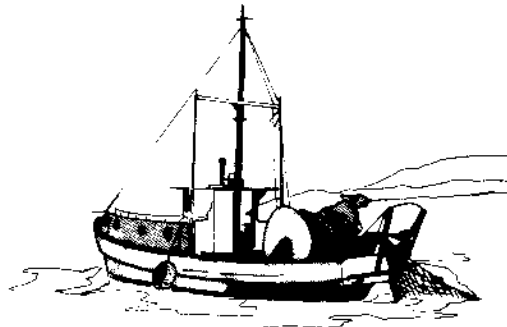
8. Only commercially important shrimp with top pair of antenna as long as stripe running down side of tail section; maximum size 8 1/2 inches.

Fishing

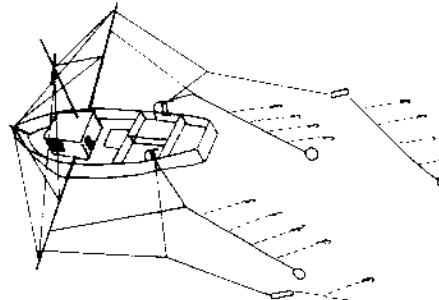
Directions: Under each picture write the name of the kind of fishing it shows. Then write the name of the kind of fish usually caught by that fishing method.



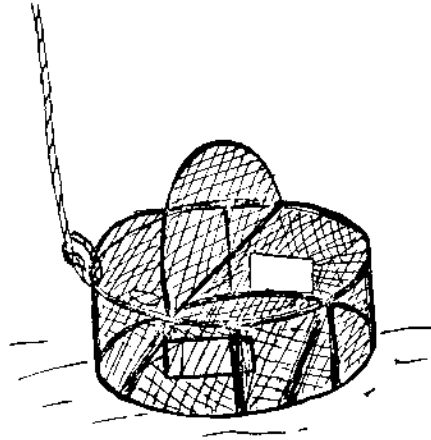
1. Kind of fishing _____
2. Kind of fish caught _____



3. Kind of fishing _____
4. Kind of fish caught _____

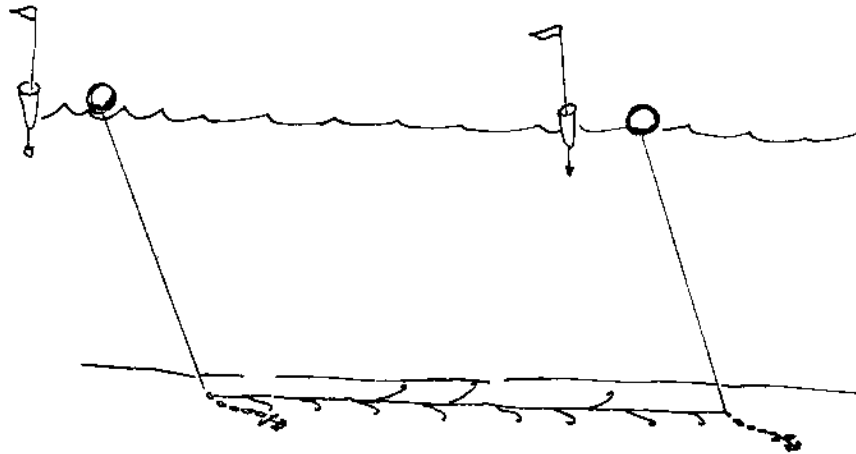


5. Kind of fishing _____
6. Kind of fish caught _____



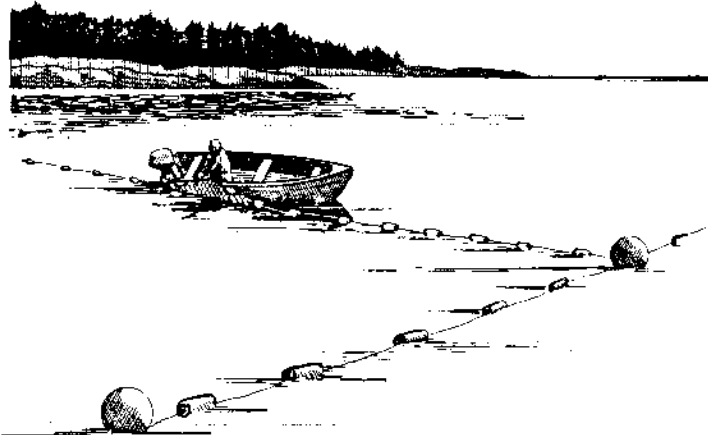
7. Kind of fishing _____

8. Kind of fish caught _____



9. Kind of fishing _____

10. Kind of fish caught _____



11. Kind of fishing _____

12. Kind of fish caught _____

Harbor Investigation

1. Draw a quick map of the harbor on the back of this sheet. Label floats, docks, breakwater, buildings, restrooms, oil dump, garbage dumpsters, electrical outlets, water lines or spigots, gasoline pumps.
2. Find examples of each type of boat and explain how you know it's that kind of boat.

NAME OF BOAT	TYPE	HOW CAN YOU TELL?
_____	gillnetter	_____
_____	seiner	_____
_____	troller (power)	_____
_____	troller (hand)	_____

_____	longliner	_____
_____	trawler	_____
_____	tender	_____
_____	sport boat	_____
_____	sailboat	_____
_____	patrol boat	_____
_____	ferry	_____
_____	freighter	_____

3. List any birds, fish, mammals that you see.

4. List invertebrates that you can find.

5. Find and describe three types of seaweed.

6. Find an example of three environmental problems.

7. Interview a fisherman or woman and the harbor master or mistress.