

Unit Six

Fish as Food

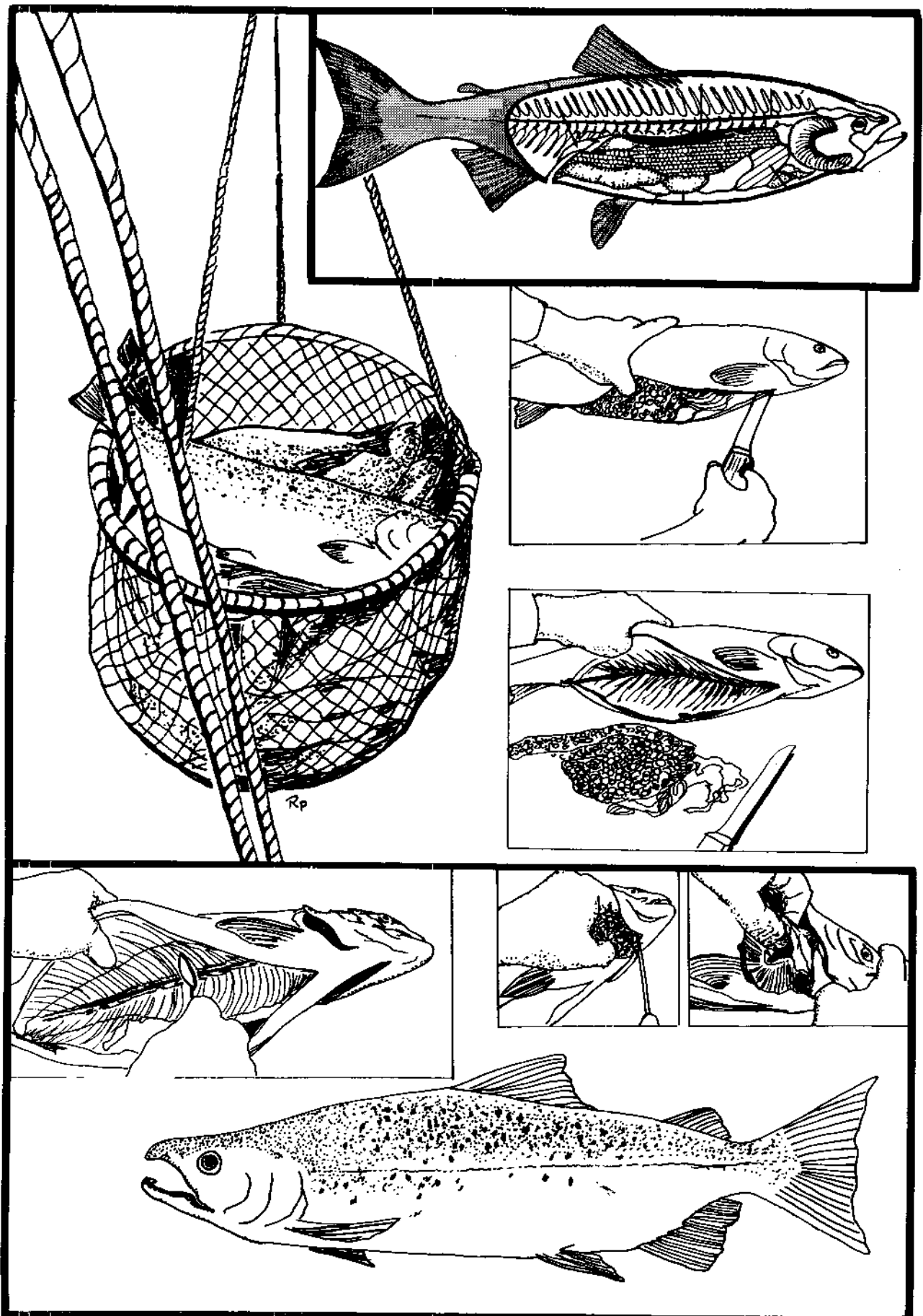
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Objectives:

To help the student:

- Compute how quickly bacteria multiply (Activity 1).
- Properly handle and clean a freshly caught fish (Activity 1).
- Read about processing fish (Activity 2).
- Diagram the workings of a cannery (Activity 2).
- Design a label for canned salmon (Activity 2).
- Survey a local grocery store for seafood products (Activity 3).
- Plot the origins of the local store's seafood on a world map (Activity 3).
- Figure the distance traveled by each of the locally stocked products (Activity 3).
- Make a fish-shaped recipe book (Activity 4).
- Describe the nutritional values of fish (Activity 4).
- Prepare and taste fish (Activity 4).
- Design a fish business (Activity 5).
- Advertise and sell a fish product (Activity 5).
- Develop a profit and loss statement and investment analysis for stockholders (Activity 5).



Unit Six: Fish as food: Salmon are cleaned as soon as possible after being caught. The fish are gutted, top right; and the kidney and gills removed before the salmon is stored on ice for shipment to a processor.

Alaskan waters produce a great abundance and variety of seafoods. Historically, people who lived along the coasts and rivers were sustained by fish, shellfish, sea vegetables and other aquatic foods. Today, many Alaskans still depend on fish, for their tables, their livelihoods or both. Commercial seafood processing is an important enterprise in Alaska, and its products are shipped around the world.

The processing industry changes continually, with new technology and new consumer demands. Consumer preference has shifted, for instance, from canned salmon to fresh or frozen salmon; but the shift came so suddenly it caught both fishermen and processors unprepared. In less than 10 years Alaska's fresh and frozen salmon production soared from around 30 million pounds to 195 million pounds in 1980. That increase amounted to more than one-third of the state's total salmon catch.

Activity 1 Fish Quality



Background:

To compete in the world market, Alaskan processors and fishermen are beginning to concentrate more on fish quality than quantity. With refrigerated cargo planes, ships, barges, trucks and trains, people can have their Alaskan fish any way they want it, no matter where they live.

Materials:

- several whole fish
- sharp knives with 5- to 6-inch blades
- cutting boards
- teaspoons
- copies of Cleaning a Fish
- worksheet:
...Taking Care of Your Catch
(6A)

Procedure:

1. Use the worksheet Taking Care of Your Catch (adapted from "How to Take Care of Your Catch," Tidelines, Vol. IV, No. 1, Sept. 1981) to start your discussion. (Answers to questions 1 and 2

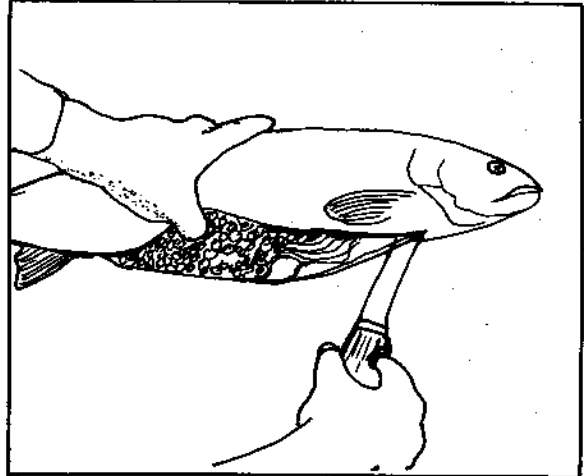
are 1,073,741,824 and 2,147,483,648,000,000,000. Remaining answers will vary among individuals.)

2. Invite parents or others to bring in several whole fish or go on a fishing expedition to catch your own. (See Unit 5, Activity 7.)
3. Have students clean the fish. Round up teaspoons and some sharp knives with 5- to 6-inch blades. Plastic or some other hard material is better than wood because knife handles is easier to clean. You'll also need cutting boards. Again, a plexiglass or steel surface is better than wood for the same reason. If you do use wood, rub the board with salt to help sanitize and cut the slime and to make the job less slippery. Pass out copies of *Cleaning a Fish*. Remind students to be careful of the knives and to always cut away from themselves.
4. Review external and internal fish features (Unit 1, Activities 4 and 5) and get ready to taste the fish (Unit 6, Activity 5). This cleaning technique is the one recommended by Dr. Don Kramer, seafood technologist and quality control specialist with the Alaska Marine Advisory Program. It was first printed in *Tidelines*, "How to Take Care of Your Catch," Vol. IV., No. 1, Sept. 1981.

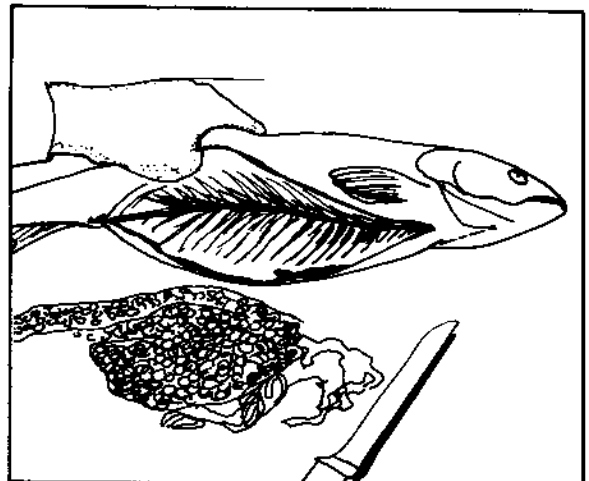
CLEANING A FISH

1. Insert the point of your knife into the vent opening, just deep enough to cut through the skin. Then run the cut

smoothly the length of the belly to a point just below where the pectoral fins join the body. Keep the cut shallow to keep from damaging the internal flesh or the egg cases.

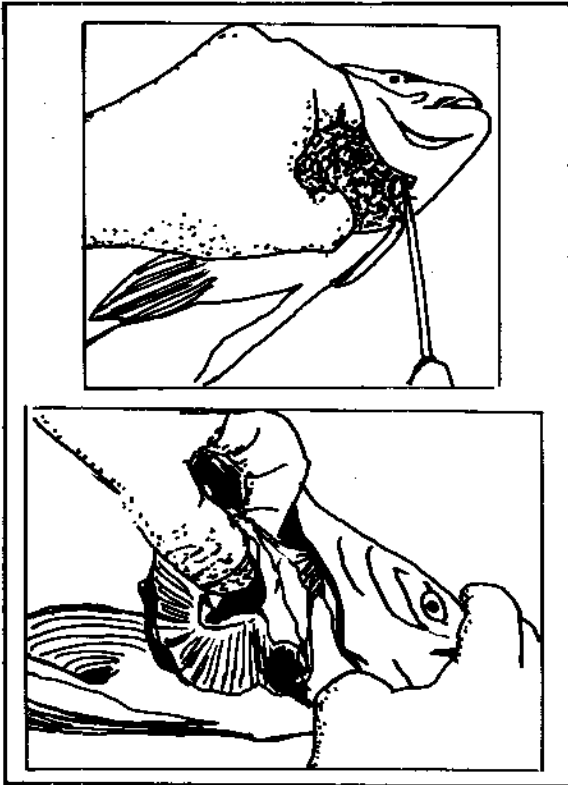


2. Carefully cut the connecting tissues at both ends of the digestive tract (throat and anal vent) and the viscera will fall right out. Wash the eggs and put them in a clean plastic bag. If you don't eat them (many people do), save them for bait--either fresh or dusted well with Borax.



3. Next the gills. Go in under the gill cover. Cut through the connecting tissue at the top and run the knife around

the jaws to the bottom. Then twist the gills out.

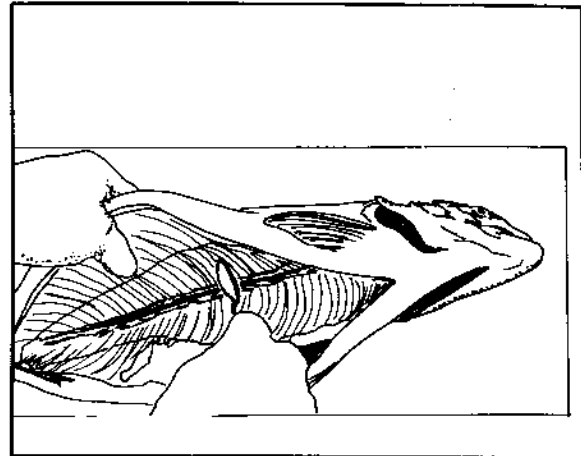


4. Now all that is left is the kidney. This looks like a line of clotted blood running along the spine from the head to the vent. Some fishermen simply slit the kidney down the middle and then scrape out the dark material. But a better way is to make two long slits through the membrane down either side of the kidney. The double cut makes the kidney easier to remove and also does away with the "ribbons" of membrane (which many processors

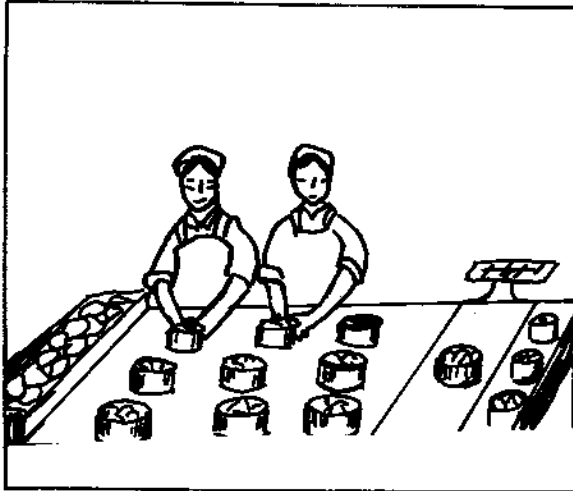
object to) that are left behind by the center cut.



5. Scrape out the kidney with a spoon. Get every trace of it. The hardest to reach is the kidney tissue in the small bones near the vent, called the "knuckles." Use the knife tip carefully, trying not to puncture the flesh. Now wash the fish inside and out with clean cold water and it's ready to be iced or refrigerated.



Activity 2 Fish Processing



Background:

Processing Alaskan salmon, halibut, king crab and other seafoods is a major industry in Alaska. Processing probably began with early settlers who shipped a few salted salmon back to their native lands.

In 1878, the North Pacific Trading and Packing Company built the first Alaskan cannery at Klawock on Prince of Wales Island. Later the same year, a cannery opened in Sitka. Within 10 years there were many canneries along the coast from Southeast Alaska to the Bering Sea.

The cannery business was a tough, a boom or bust operation. If fishing in nearby waters was good, the cannery might thrive; but no fish meant failure for the operation. In addition, there was cutthroat competition between canneries and their wealthy backers. Sometimes price wars erupted, with the one packing company undercutting others in an attempt to bankrupt the competition.

Today, cannery operations still involve risk. Fishing from year to year can be good or bad. Markets fluctuate, and prices and profits go with them. Abandoned canneries dot the Alaskan coast, many of them old and long-deserted; and each year more canneries consolidate or close.

Materials:

- colored pencils or felt-tip markers
- paper
- a variety of salmon cans
- What Happens in an Alaskan Salmon Cannery illustration
- the manager of a fish processing plant or a cannery worker
- worksheet:
...Salting, Canning, Freezing, and Smoking (6B)

Procedure:

1. Ask students how they preserve fish. Then pass out the worksheet Salting, Canning, Freezing, and Smoking. (Answers: 1: freezing, smoking, or drying; 2: salting; 3: king (also red and silver) salmon; 4: canned or frozen; 5: glaze it with a thin covering of ice; 6: false.)
2. Have the students diagram what happens in an Alaskan salmon cannery. Use the "What Happens in an Alaskan Salmon Cannery" illustration for reference. Go through the steps one by one on the board and let students make their own drawings with colored pencils or thin felt-tip markers as the class talks about them. Have the students predict what happens from one step to another.
3. Invite a local cannery man-

ager or worker to talk about the fish processing business and critique your class's drawings. Better yet, take a trip through a cannery and have the students check the accuracy of their own drawings. In the Interior, you should be able to find a parent or brother or sister of one of your students who has worked in a cannery.

4. Have the students look over different canned salmon labels and then design their own.
5. Discuss home canning and the need to use clean and sterile utensils and containers to prevent botulism. This type of bacteria can appear in many foods besides fish. Botulism cannot be smelled or tasted, so students should watch for damaged cans or canned lids that are puffed outward.
6. List the benefits of canning, freezing, smoking, drying, salting, pickling, and eating fish fresh.

Activity 3 Grocery Store Survey

Name		Date		Town/Village	
Grocery	PRODUCT	PACKAGING	COUNTRY OF ORIGIN	SIZE & PRICE	ADDITIONAL COMMENTS
1.					
2.					
3.					
4.					
5.					

Background:

Grocery stores are the consumer's main contact with the fishing industry. Fresh, frozen, canned, pickled, smoked and dried fish as well as other seafood products from all over the world line the shelves, refrigerator, and freezer compartments.

Materials:

- sample of seafood products
- grocery store
- pencils
- world map
- colored yarn
- tacks
- small slips of paper
- worksheet:
...Grocery Store Survey Form
(6C)

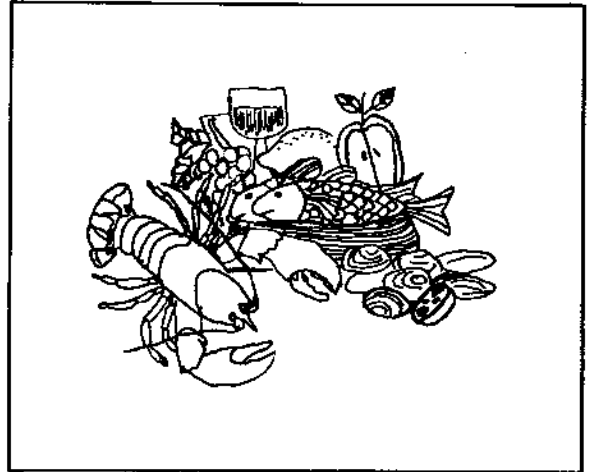
Procedure:

1. Ask students what seafood products they eat. Ask about others that they know about. Then plan a field trip to a grocery store or assign students to fill out the survey form as an assignment.

Pass out copies of the Grocery Survey Form. Have students complete the first few items with samples that you've bought. Encourage students to look in the ethnic sections of the store and to read labels closely. (Ice cream for instance, has seaweed extract--algin--in it to make it extra smooth.) Then see how well your super sleuths do at finding the amazing number of products from the sea.

2. Make a class list of all the products and mark each on the world map with a tack and a small slip of paper listing the product by name. Tuck pieces of yarn from the tacks to your town or village.
3. Figure the distance traveled by each product and the cost per pound of each product. (Save these figures for Activity 4 in this unit.)
4. Follow-up this activity by discussing the role of Alaska in feeding the world (Unit 6, Activity 3) and by trying the next activity - fish nutrition and a fish feast. Students may want to purchase some of the products they discovered at the store for their feast. Mention that what everyone likes to eat is a result of where they grow up and of what their parents and friends eat. Encourage your class to try foods new to them--some of which they'll find wonderfully delicious.

Activity 4 Nutrition and a Fish Feast



Background:

Fish is rich in vitamins and minerals and is a delicious source of protein. Fish and shellfish can provide in generous amounts most of the nutrients the body requires. High quality amino acids in fish are readily digested; and fish products are rich in B complex vitamins such as thiamine, riboflavin, niacin, vitamin B₆, vitamin B₁₂, and pantothenic acid. Fish is also a good source of calcium, iron, potassium, phosphorus, copper, iodine, manganese, and cobalt. Fish is especially good for heart patients because it is low in sodium and the great majority of species are low in fat. Fish is low in calories, too!

Seafood meals are time and money savers. Preparation is simple with little waste. No special equipment is required. Seafood can be mixed with soups, chowders, and casseroles and goes well with almost any spice. It can be baked, broiled, grilled, poached, steamed, or fried. Many ethnic groups have settled in Alaska and their recipes have been passed from generation

to generation providing a great variety of culinary delights.

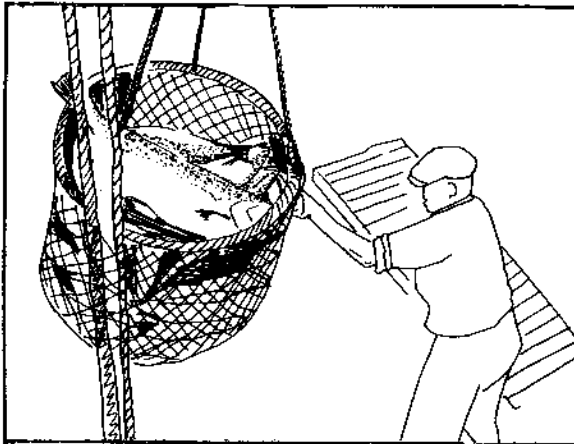
Materials:

- seafood
- spices
- cooking utensils
- heat source
- plates and silverware
- paper
- pencils
- crayons, colored pencils or narrow felt-tip markers
- construction paper
- scissors
- stapler

Procedure:

1. Discuss with students how fish are prepared in their homes. Ask them to bring several of their favorite seafood recipes from home for a class cookbook. Mimeograph copies and have the students place them in fish-shaped booklets with construction paper covers for family presents and student mementos. Alternatively, copy your recipes on fish shapes and place them in a bulletin board of pots--ready to be cooked! (Suggested by Sandy Poor and Ann Schultz, Mt. Eccles Elementary, Cordova)
2. Discuss seafood nutrition and cooking. Important to remember about seafood is that it should not be overcooked. Crabs and shrimps should be steamed about 10 minutes. Clams need only a few minutes of steaming or frying. Fish requires less cooking time than "red" meats. Fillets and steaks should be tested often with a fork while cooking to avoid overcooking. When fish flakes, it's done.
3. Have the students assist you in planning a seafood snack or feast. Invite parents to bring favorite seafood dishes. Have students prepare some of the simpler recipes, measuring ingredients and computing quantities. You might want to purchase a variety of seafoods from the store or the whole feast could originate there. Or you might want to try making some special local recipes such as cooking in a fire pit, smoking or pickling fish. For additional suggestions, write to the Alaska Seafood Marketing Institute, 526 Main Street, Juneau, Alaska 99801.

Activity 5 The Fish Business



Background:

The fishing industry is vital to Alaskan economy. Twenty-five percent of Alaska's jobs are connected directly with fishing and many more depend upon it indirectly. There are many costs involved in getting fish from water to mouth. Perhaps the best way for students to understand the fish business is to try it themselves.

Vocabulary:

- product
- consumer
- perishable
- capitol loan
- market value
- profit
- loss
- labor
- wholesale
- retail
- advertising
- sales
- competition
- investment
- stocks
- stockholders

Materials:

- prices of fish at various

- stages of processing
- seafood product to sell
- poster paper
- felt-tip markers

Procedure:

1. Approach students with the idea that now that they know something about fisheries, maybe they would like to get into the fish business. The business can be real or imaginary. Ask them what local seafood products would make a good investment. Go over the price figures from Activity 3 in this unit and see what looks like the best bet to make a profit and what they think people would like to buy, such as specially prepared fish (smoked or pickled); fresh fish delivered to their door; canned salmon with a delicious recipe attached; sometimes hard to obtain seafood (clams, crabs); or a local tradition (hot fish and chips).
2. Have students check out the market (by asking their parents or friends if they would like to buy a particular item and at what price). Who will be the competition? Students may even do some preliminary figuring such as checking:
 - costs of boat and gear
 - cost of fuel
 - boat maintenance and repairs
 - time spent fishing
 - amount of fuel used
 - captain wages
 - crew wages
 - price paid to the fisherman by the processor
 - electricity and water
 - costs of can or other packaging

- wages paid to cannery workers
- salary paid to cannery supervisors
- price of fish sold to wholesaler
- transportation costs (shipping)
- retail price on the shelf

To have much meaning, the figures will need to be standardized with such a standard of comparison, to cost-per-pound. Students then can relate such items as cost of fuel per pound to the price paid per pound to the fisherman, the retail price per pound, and so on.

3. One of the biggest considerations with seafood is perishability. Have the students decide how to get their product from the water to the consumer as quickly as possible, using a good method of preservation.
4. Have the students decide on one product to sell and a name for their business. If students need money (capitol)

to start their business, check with a local banker. Students may prepare a mock presentation and go in and ask for a loan. Or they might want to sell stock.

5. Develop an advertising campaign. Have the students make posters about their product and plan business details such as advance orders, who's going to get the product, who will transport, who will sell it, who will take the money and keep track of profits and losses.
6. Then the students should be ready for business. They might even want to have a grand opening!
7. After the product is "sold," have the students figure profits and losses, analyze their strengths and weaknesses as a business, and write a stockholders' report. Discuss such correlation between the student business and the fishing industry as transportation, preservation, weather problems and fish product availability.

Taking Care of Your Catch

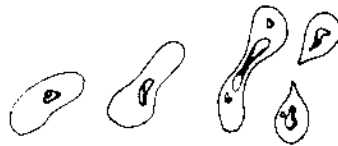
by Virginia Sims, editor of ALASKA Tidelines

Think back to all those great fishing trips you've been on (or are planning). What happens after you land a big one? Do you clean and gut it right away or do you throw it in the bottom of the boat or on the riverbank? Does it matter? Read on.

WHO CARES ABOUT A TEENSY BACTERIUM?

Take a tiny one-celled creature called a bacterium. (The "um" ending is singular; the "a" is plural.) It is one of the teensiest life forms on the face of the earth. They are all over the place and you can't even see them. It would take about 400,000,000 bacteria just to form a clump the size of a grain of sugar.

Nothing to worry about, right? Well, take a look at how they grow.



Bacteria don't grow by getting bigger and older. Instead, they divide themselves by splitting in two. As you see here, the cell stretches out, then squeezes in the middle and finally breaks apart, forming two cells.

Under ideal conditions, one bacterium can divide every 20 minutes. And those ideal conditions might well be met by a dead fish (right food) in a warm sloppy fish box (right temperature/right humidity).

So it's a beautiful day and you've gone fishing. You catch your first salmon at 7 a.m., put it in the fish box and figure you'll clean it when you get home. You arrive back at the dock at 5 p.m. What has one bacterium done in those 10 hours? Figure it out for yourself:

	+ 20 mins.	40 mins.
7 a.m.		
8 a.m.		
	(Keep multiplying by 2)	
9 a.m.		
10 a.m.		

11 a.m.

12 noon

1 p.m.

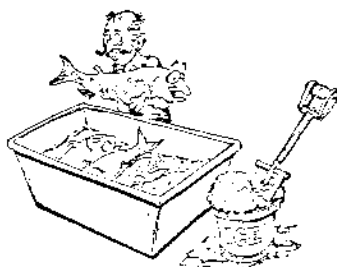
2 p.m.

3 p.m.

4 p.m.

1. So at 5 p.m., that 1 teensy bacterium has multiplied into _____.
 2. Now figure out how many bacteria those 400,000,000 in that clump the size of a grain of sugar could have multiplied themselves into:
-

So, when you go fishing, KEEP IT COOL! The flesh of most fish is free from bacteria. But the gills and guts are loaded with them. They do little harm while the fish is alive. But after the fish dies, they begin to multiply like mad and the warmer the fish, the faster they spread. When this happens, we say the fish is spoiling. What is really happening is that bacteria are "eating up" the warm, dead fish.



The best way to slow down bacterial growth is to keep the fish cold. And the best way to do that is with ice - lots and lots of clean crushed ice that will hold the fish just about at the freezing point. There are times, of course, when you can't pack a supply of ice along on your fish trips. But you should still keep your catch as cool as possible. Even putting the fish in the shade or covering it with a wet gunny sacks helps a lot.

AND KEEP IT CLEAN! All fish should be gilled, gutted, bled and washed just as quickly as possible after they are caught. This helps get rid of the worst of the bacteria. And it also does away with the No. 2 among the big spoilers, which are called enzymes (EN-zymes - rhymes with, well, rhymes).

Enzymes are the juices we all have that help digest the food we eat. After the fish dies, these juices keep right on working and can eat their way through the stomach wall and into the flesh. This makes the flesh turn brown and soft, a condition fishers call "belly burn."



Keeping the fish cold slows down this action, too. And when fish are caught in great quantities, as in nets or trawls, chilling is often the only practical way to go.

All this gilling, gutting and cleaning isn't going to do much good if you then throw your fish into a slimy bloody fish box or on the bottom of the boat. (It's surprising how fast a fish can pick up the smell and taste of gas and oil in the bilge water.)

Everything a fish touches - holds, fish boxes, decks - should be cleaned after each fish trip. Look at it this way. Fish is food, and you should try to keep your boat as clean and bacteria-free as a kitchen. That also includes clean knives, tools, gaff hooks and cutting boards.



So be sure you **HANDLE WITH CARE!** The best way to pick up a fish - especially a big fish - is through the gills behind its head, never by its tail. Alive or dead, fish bruise very easily. Bruises release blood into the flesh and show up as black or brown spots. Often these spots don't appear until after the fish is frozen. But when they do, forget about trying to sell it.

The most common ways of bruising a fish are:

- Picking up or pulling a heavy fish by its tail.
- Stepping on it.
- Throwing it roughly into the fish box or hold.
- Letting it flop around on the deck or in the fish box.

Be careful, too, in boating your fish. Most sports fishermen use a net to haul a big fish aboard. But if you must use a gaff, hook it in the head, not in the side.

3. Now, plan your next fishing trip to

_____.

4. How will you keep your fish cool?

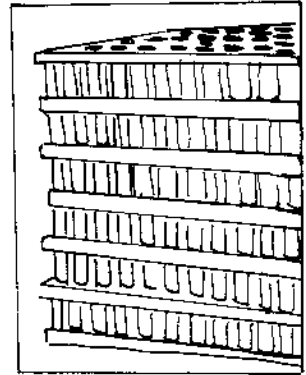
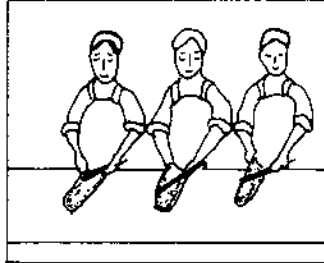
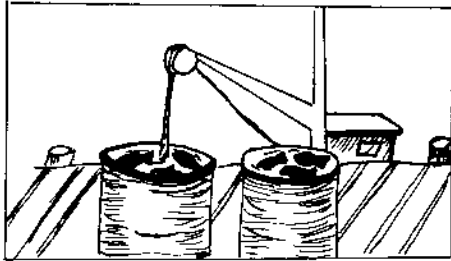
5. Keep it cleaned?

6. Handle with care?

By now you should be ready for a super taste treat of fresh fish!



Salting, Canning, Freezing, and Smoking



Long before anyone thought of selling Alaska's seafoods, Native people had solved the problem of keeping these perishable foods for future use by drying, smoking or freezing.

During the days of Russian activity in Alaska, salmon began to be salted as a way of preserving it, and for awhile, several salteries operated on Alaska's coast. Salted salmon was packed in barrels and sent across the ocean to Russia.

Canneries for salmon began to appear along the Alaskan coast in the late 1800s. The first cannery was built at Klawock on Prince of Wales Island in Southeast Alaska in 1878. By 1929, 156 canneries were operating in Alaska. Some canneries did well, but others operated for a few years and then closed. Today, salmon canning is still a big business, but Alaska's coast is dotted with the rotting remains of canneries that failed.

Today Alaska's seafoods are processed in several ways to prepare them for the market. Some fish, especially the highly valued king salmon, may be quickly handled and flown out of Alaska still fresh and ready for fish markets or restaurant use. Some of the fresh salmon is cut into fillets and smoked. Many people pickle some of their fish. More of Alaska's seafoods are frozen then are sold fresh, and more yet are canned.

If fish are to be frozen, they must be carefully cleaned in a cold storage plant. Fish can be frozen whole or in serving pieces. In most Alaskan plants, fish are frozen whole after being cleaned and headed. For freezing, fish are placed on racks and wheeled into freezer rooms where the temperature may be many degrees below zero. Freezing preserves fish, but if they are to be kept frozen for a long time, they must be glazed with ice to keep out the air.

Canning is an important way of preserving salmon. The types

of salmon most often canned are sockeye and pink. Many canneries are open only during the summer months when salmon are being caught. When the canneries are busy, many people are needed for the work and they put in long days cleaning, cutting and canning salmon.

Answer these questions:

1. Fish such as salmon are often preserved by Alaskan Natives by _____, _____ or _____.
2. Early Russians could send salmon back to Russia by first _____ it, then putting it in barrels to ship.
3. What kind of salmon is often flown out of Alaska fresh for use in restaurants and fresh fish markets?

4. Today, salmon that will be shipped to other states or countries for food is either shipped fresh or it is _____ or _____.
5. A good way to freeze salmon is to _____.
6. Canneries usually operate all year-round (true or false). _____

Name _____

Date _____

Grocery Store Survey Form

Grocery _____ Town/Village _____

PRODUCT	PACKAGING	COUNTRY OF ORIGIN	SIZE & PRICE	ADDITIONAL COMMENTS
1.				
2.				
3.				
4.				
5.				
6.				
7.				
8.				
9.				
10.				
11.				
12.				
13.				
14.				
15.				
16.				
17.				
18.				