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 sternpicker?
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 person 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 weighs 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 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

Dungeness Pot

bait can

frame

cut

floats

door

door

floats

frame

bait can

cut

cut
Shrimp and Crab Matching

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

_____ 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.
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.

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.

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.

8. Only commercially important shrimp with top pair of antenna as long as stripe running down side of tail section; maximum size 8½ 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
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.

<table>
<thead>
<tr>
<th>NAME OF BOAT</th>
<th>TYPE</th>
<th>HOW CAN YOU TELL?</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>gillnetter</td>
<td></td>
</tr>
<tr>
<td></td>
<td>seiner</td>
<td></td>
</tr>
<tr>
<td></td>
<td>troller (power)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>troller (hand)</td>
<td></td>
</tr>
</tbody>
</table>
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.
Captains Know Their Boats

To fish, a person must know many things and have many skills. Among the most basic is how to talk about a boat.

Each part of a boat has a special name. Knowing these names makes it easier to talk about the boat. Here is a diagram of a boat and a list of terms and definitions used to describe its parts. See if you can label the parts correctly.
Keel - a timber or plate running lengthwise along the center bottom of a boat.

Hull - the outer covering of the main part of a boat.

House - the cabin or living space built above the deck and hull.

Mast - a long pole rising from the deck of a boat and used to support various rigging.

Boom - a long pole that extends horizontally from the mast. It may be used to hold the bottom of a sail or to support gear or rigging.

Bow - the forward part of the boat.

Stern - the aft, or rear, part of the boat.

Port - the left hand side of the boat if you are facing toward the bow.

Starboard - the right hand side of the boat if you are facing toward the bow.

Rudder - a "board" below water level at the stern of the boat. Changing its position mechanically makes the boat turn or change direction.

Propeller - a blade-bearing device which powers turns and by its motion, moves the boat.

Crow's Nest - lookout point at the top of the mast.

Scuppers - holes that allow water to drain off the deck.

Flying Bridge - the location from which a boat is steered and its speed controlled.
Ship Ahoy!

Stow that landlubber chatter and try your hand at becoming an old salt!

Put the letter of the landlubber meanings in front of the old salt sayings.

<table>
<thead>
<tr>
<th>LANDLUBBER</th>
<th>OLD SALT</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Park the boat.</td>
<td>1. Cast off, matey.</td>
</tr>
<tr>
<td>b. Come on in.</td>
<td>2. Haul on that line.</td>
</tr>
<tr>
<td>c. Secure the doors.</td>
<td>3. Get below.</td>
</tr>
<tr>
<td>d. Go downstairs</td>
<td>4. Swab the deck.</td>
</tr>
<tr>
<td>e. Untie the ropes and let's go.</td>
<td>5. Use the head.</td>
</tr>
<tr>
<td>f. Go to bed.</td>
<td>6. Pump the bilges.</td>
</tr>
<tr>
<td>g. Drain the basement.</td>
<td>7. Roll into your bunk.</td>
</tr>
<tr>
<td>h. Life preservers are in the back.</td>
<td>8. Man the helm.</td>
</tr>
<tr>
<td>i. Pull that rope.</td>
<td>9. Stow your gear.</td>
</tr>
<tr>
<td>j. Wash the floor.</td>
<td>10. Welcome aboard.</td>
</tr>
<tr>
<td>k. Drive the boat.</td>
<td>11. Make fast to the dock.</td>
</tr>
<tr>
<td>l. Go to the bathroom.</td>
<td>12. She's listing to the starboard.</td>
</tr>
<tr>
<td>m. Put your clothes away.</td>
<td>13. Go aloft.</td>
</tr>
<tr>
<td>n. Get up above.</td>
<td>14. P.F.D.'s are aft.</td>
</tr>
<tr>
<td>o. Put everything in good order.</td>
<td>15. Make everything shipshape.</td>
</tr>
<tr>
<td>p. The boat's leaning to the right.</td>
<td>16. Batten down the hatches.</td>
</tr>
</tbody>
</table>
Port of Anchorage Chart

Nautical charts are the road maps of the sea. They tell you how deep the water is and what the bottom is like. They warn you of rocks, reefs, mud flats and other hidden hazards. And they show the signposts you need, such as lights, bells, buoys, and landmarks on shore.

The waters of Cook Inlet are so tricky that a special pilot is required on all large vessels traveling north of Homer. But there's no law against a little desktop navigation. So study the legend in the lower right-hand corner and steer yourself safely into port.

1. In the lingo of the sea, starboard is to your right as you face the front of your boat, and port is to your left. (An easy way to remember: "port" and "left" have the same number of letters.) So from your boat's position shown on the chart, Moose Point is on your _________ side and the lighted (oil) platform is on your _________ side.

2. The Inlet bottom right about there is generally _________ and _________.

3. Moving right along, you have reached the buoy in the middle of the Inlet north of Point Possession. Water depth is usually measured by the fathom, which is equal to six feet. The chart shows the water depth here is 11 fathoms. How many feet is that? _________

4. When heading in from the sea, the general rule is to keep red buoys and even numbers on your starboard side, and green lights or black buoys with odd numbers on your port side. (Remember: "red-right-returning.") So you want to keep that buoy on your _________ side.

5. Now you're off Fire Island and lined up with the beacon lights on Point MacKenzie. (Note the solid and dotted lines on the chart which show the recommended route into port.) How high is the top light? _________ What does "E Int 6sec" mean? _________

6. Getting close! Keep that N "2" buoy to your _________ side.

7. The Port of Anchorage is in sight and you're on your own. Your vessel draws (needs) 36 feet of water. So check the fathom markings (this chart shows depths at average low low tide) and draw a line to plot your course to the dock.
LEGEND

All soundings (depths) are in fathoms (6 feet) at mean (average) lower low tide.

\[ \text{less than 10 fathoms} \]

\[ \text{10 fathoms or more} \]

\[ \text{mean higher high water} \]

\[ \text{mean lower low water} \]

Bottom

\[ \text{hrd} \] hard

\[ \text{rky} \] rocky

\[ \text{stk} \] sticky

\[ \text{sft} \] soft

\[ \text{SPSt} \] sand, pebbles, stones

\[ \text{gySP} \] gray sand, pebbles

Hazards

\[ + \] sunken rock

\[ * \] rocks that cover & uncover with tides

Buoy & Beacons

\[ \$ \] buoy (lighted)

\[ \& \] buoy (unlighted)

\[ \# \] beacon (land)

\[ \( \) \] RA (radar dome)

\[ \text{N} \] "nun" (black buoy)

\[ \text{C} \] can buoy

\[ "2" \] number on buoy

\[ \text{R} \] red

\[ \text{G} \] green

\[ \text{Fl} \] flashing

\[ \text{Qk} \] quick

\[ \text{E} \] equal

\[ \text{Int} \] intervals

\[ \text{sec} \] seconds

\[ \text{ft} \] feet above water at high tide

\[ \text{M} \] nautical mile (distance can be seen)

\[ \text{PA} \] position approximate

\[ \text{obst} \] obstruction

\[ \text{LTOBSC} \] light obscured
Nautical Knots

A knot is something you tie, but also a way of measuring how fast a boat travels! On land we talk about how many miles per hour a car or snowmobile can go. On water, if a boat is moving at one knot, it is traveling one nautical mile per hour. A nautical mile is a little longer than a land mile. So if a boat goes at a speed of 8 or 9 knots, it is traveling at about the same speed as 8 or 9 miles per hour. Not very fast on land but a good speed for a boat!

1 knot = 1 nautical mile per hour

Try these knotty problems.

1. If your boat travels 45 nautical miles to get to the fishing grounds at a speed of 9 knots, how long will it take to get there?

2. To travel from one fishing spot to another, your boat travels for 10 hours at a speed of 7 knots. How many nautical miles did your boat travel?

3. Coming back to port, your fishing boat traveled five hours and went a total distance of 30 nautical miles. At what speed (how many knots) was it traveling?

4. If fuel costs $1.50/gal. and your engine averages 3 knots/gallon, how much did your 30 nautical-mile trip back to port cost?

5. Now make up your own knotty problem and exchange it with your neighbor to see if he or she can do it!
# Eight Knots

**Directions:** Practice tying these knots until you can tie them blindfolded. Sometimes you may need to tie them fast, at night, in cold weather.

<table>
<thead>
<tr>
<th>Knot Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>FIGURE EIGHT</strong></td>
<td>Use to keep the end of a line from unraveling or as something to hold onto.</td>
</tr>
<tr>
<td><strong>BOWLINE</strong> (pronounced bōlyn)</td>
<td>Use to tie a non-slip loop at the end of a line. The bowline does not jam and can be untied.</td>
</tr>
<tr>
<td><strong>SHEET BEND</strong></td>
<td>Use to tie two uneven lines together.</td>
</tr>
<tr>
<td><strong>TWO HALF HITCHES</strong></td>
<td>Use to make a line fast to a piling or a ring.</td>
</tr>
<tr>
<td><strong>SQUARE KNOT</strong></td>
<td>Use to tie two light lines of the same size together. (Be sure that the line going into one side on top is going out on top as it comes back through--otherwise it's a granny knot and won't hold!)</td>
</tr>
<tr>
<td><strong>CLOVE HITCH</strong></td>
<td>Use to make a line fast temporarily to a piling. (Be sure you push the top and bottom together, or it won't hold!)</td>
</tr>
<tr>
<td><strong>FIGURE EIGHT ON A CLEAT</strong></td>
<td>Use to tie to a cleat. (Make sure the line is wrapped around the base of the cleat first.)</td>
</tr>
<tr>
<td><strong>FISHERMEN'S BEND</strong></td>
<td>Use to make fast to a buoy or the ring of an anchor. This knot is also called the anchor bend.</td>
</tr>
</tbody>
</table>
Tides involve the rising, and lowering and movement of great masses of water. People fishing watch the tides almost as closely as people living on land might watch a clock. Boats can go dry or float away, depending on the tides. Channels can be too shallow to get through on a low tide. Fishing is often best on a rising tide.

If water is moved through a narrow opening by the tides, a tidal may be very evident. In fact, it may be so strong that a boat cannot move against it even at full power. Even on the coast of the open ocean, tidal currents are sometimes very strong. People traveling from one place to another by boat, they try to time their travels in such a way as to be going in the same direction as the tidal current. That gives them a faster trip and saves on fuel. A great deal of where and when and how a person fishes depends on the strength and direction of the tidal currents.

Knowing how to read a tide book is important. The main part of a tide book gives the time and height of the tides for every day of the year for several main locations. Additional pages of corrections enable the reader to figure out the same kinds of information for other nearby places.

On the following page are two pages from a tide table. Look at them, and notice there are two low tides and two high tides on most days. Then answer the following questions.

1. On November 1, how high is the highest tide in Cordova?

2. On November 1, how low is the lowest tide in Cordova?

3. What time are the high tides in Cordova on November 15? _____ and _____

4. What time are the low tides in Cordova on November 22? _____ and _____

5. On what day in November is the lowest tide of the month in Cordova? _____

6. On what day in November is the highest tide of the month in Cordova? _____

7. On November 16, what is the difference in the height of the water when the tide is at its lowest and when it is at its highest? _____
# Tide Tables

## HIGH Tides CORDOVA District
### NOVEMBER 1983

<table>
<thead>
<tr>
<th>DATE</th>
<th>DOT'S DAY GUIDE</th>
<th>A.M. TIME</th>
<th>P.M. TIME</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Tues</td>
<td>9:36</td>
<td>12.7</td>
<td>9:49</td>
</tr>
<tr>
<td>2 Wed</td>
<td>10:16</td>
<td>13.6</td>
<td>10:42</td>
</tr>
<tr>
<td>3 Thur</td>
<td>10:56</td>
<td>14.4</td>
<td>11:33</td>
</tr>
<tr>
<td>4 Fri</td>
<td>11:32</td>
<td>14.8</td>
<td></td>
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## LOW Tides CORDOVA District
### NOVEMBER 1983

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*Bigger the dot—better the fishing*

STANDARD TIME
Putting Out to Sea

Working at sea is tough and dangerous, and much of the hazard comes from the sea itself. Alaskan waters, for example, are so cold that, unprotected, a person can survive no longer than 30 minutes before becoming unconscious. In addition to the cold water, sudden storms and winds can whip seas into huge waves capable of endangering even the largest and strongest of vessels.

Modern equipment has helped make boating and fishing safer, but the most important part of being safe is still to be very cautious and to know and understand as much as possible about winds, weather and the ways of the sea. Eskimo hunters sometimes travel far from land in small boats, but they carefully watch changes in the sky, the wind and the sea and know what even the slightest changes mean to them and their safety. People traveling the rivers of Interior Alaska must know the swift parts of the river where currents or eddies are dangerous and the shallow places. People fishing salmon or halibut on the open sea must always carefully calculate how long they dare stay out and fish if the weather is deteriorating. They must know when to run for shelter of safe bays or other anchorages along the coast.

Here is a list of equipment needed for a safe voyage. Draw a picture of a boat that you would like to own and show and LABEL the safety equipment you'll need.
1. **A stout boat.** Any boat that goes to sea should be strong, in good shape, and free of leaks or rot that will make it weak.

2. **A radio.** Many boats have two kinds of radios. A citizens band radio, or CB, can be used for talking over short distances, such as to a boat fishing nearby. A very high frequency radio, or VHF, is used for talking over longer distances. With a VHF radio, a person can make ship-to-shore, long-distance phone calls; can get up-to-date weather forecasts; or can call the U.S. Coast Guard if there is an emergency and help is needed. On a small boat, a regular transistor radio can be used to listen to periodic weather forecasts. Be sure and check the weather forecast before even starting your trip!

3. **Life preservers and/or survival suit.** By law every boat is required to have one approved life preserver or P.F.D. (personal floatation device) for each person on the boat. Many fishing boats carry survival suits as well. Survival suits are like loose fitting diving suits. They are made out of neoprene rubber and insulate a person's body from icy waters. With a survival suit, a person can stay alive in the open sea for several days awaiting rescue.

4. **Life ring and line.** These should always be handy to throw to anyone who falls overboard because sometimes it takes awhile to turn the boat around.

5. **Survival gear.** If you're tossed on shore in an open life boat, survival gear can be most helpful! Wrap a spare sleeping bag in a waterproof bag or plastic bags together with a survival kit containing food, matches, flares, propane lighters, signal mirror, fishing line and hooks, tarp or pieces of plastic, water, etc.

6. **Life raft.** Some life rafts store in small containers and automatically inflate and release if the vessel sinks. The life raft will give shelter and help conserve the body heat of people who have abandoned their boats at sea. Be sure to store emergency food and water with the raft and have the raft checked every so often to make sure it will still inflate!

7. **Fire extinguishers.** Surrounded by water on a boat, there may be no way to put out a fire unless there is an extinguisher that will put out electrical or chemical fires.
8. **Bilge pump or bailer.** Water does sometimes come inside boats, and it's very important to be able to get rid of it quickly! Larger boats require bilge pumps. Always have a spare handy too! Smaller boats can use a bucket or can for bailing.

9. **Radar.** Having radar is like having eyes that can see in the fog or the dark. With radar, a person on a boat can watch at night for other nearby boats, can see icebergs ahead or large floating logs that might damage the vessel. The operator can also see the shape of a river, the outline of a coast and can measure the distance from the boat to any of these. Many fishermen these days are buying Loran systems as an alternative radar. Courses can be programmed so boats can get through channels in the dark. Loran utilizes the differences in two radio pulses to determine position.

10. **Fathometer.** This instrument shows the depth of the water. Water depth changes with the tide and fishermen must often be careful of where and when they cross shallow areas. No one wants to end up high and dry on a mud flat or a reef. People fishing often use a recording fathometer that provides depths on a long sheet of paper. This kind of fathometer will tell how deep the water is under the boat and will record small black marks for every fish passing beneath the boat.

11. **Horn, whistle and/or bell.** In times of poor visibility, some sort of warning is needed to keep vessels from running into each other. The Coast Guard has outlined rules of the road for different situations. The danger signal is four short blasts.

12. **Charts.** No one should set out in a boat without having a good chart of the area--either inside his head or on paper. Charts for all coastal areas are put out by the United States government. They show depths, hazards, harbors--everything that is known about a particular piece of coast line. The government also puts out a book called The Coast Pilot that describes coastal features shown on the charts.

13. **Compass.** Under conditions of poor visibility, there may no other way to keep track of where you are.

14. **Anchor.** If any vessel is in distress, it may drift into shallow water where an anchor can hold it securely and prevent it from being tossed on a rocky shore. And when you anchor, be sure you attach even line to allow for a rising tide!
15. **Tools, spare parts, and a spare motor.** Many times whether you get back before dark will depend on your mechanical ability, tools, parts, and a spare motor!

16. **Lights and spare batteries.** If you need to attract attention, work on your motor in the dark, anchor your boat at night, or find the channel, lights are very necessary. When running at night, boats should show a red light on the port side and a green light on the starboard, plus white lights on the bow and/or stern depending on the size of vessel.

17. **Oars.** Every motorboat should have oars and spare oars aboard. A motor can always quit or run out of gas. Then oars and muscle power become important.

18. **First aid kit.** Basic supplies include bandages, antiseptic and burn ointments, lotions, aspirin, bandaids, tape, scissors, tweezers, thermometer, safety pins, cotton, and a first aid book!

19. **Sailing plan.** Always leave word of where you're going and your planned date and time of return with your family, friends or the harbor master, so they'll know where to look if you fail to return.
The Safety Afloat Game

To the Teacher:

Make four copies of this sheet. Back sheets with tagboard. Carefully cut out each Safety Device and glue to end of a cocktail swizzle or similar small stick. Back playing board on tagboard, cover with clear laminate if possible. Store Safety Devices in an envelope.

Objective of the game is to enable students to identify by sight and name the Safety Devices needed aboard boats.

Approved Fuel Tanks

Sailing direction and Return time left with harbor master

Bouyant materials to throw over board for rescue.

Lights and extra batteries

Radar Finder

P.F.D.
Personal Floatation Device

Mooring Lines for mooring for Rescue Retrieval.

Bailing Bucket

Fire Extinguisher(s)

First Aid Kit and Manual (Marine type)

Extra Oars or Paddles

Flares or other distress signals.

Bilge Pump

Boat Hook*

Food and Water Rations

Transister Radio

Anchor

Bell

Horn or Whistle

Tool Kit

Spare Parts

*Playing Piece for each player to use.
TO PLAY - 2 TO 4 PLAYERS

1. Place Safety Devices in hand and release in pile in the Safety Afloat Net.

2. Each player in turn removes as many Safety Devices as possible without moving any but the intended one.

3. Each time a player must name the Safety Device before attempting to remove it. A single plain "boat hook" is used for each player who places all "caught" safety devices on his "ship."

4. Play is terminated when any Safety Device other than the one intended moves. At the end of each turn, one Safety Device must be returned to the net.

5. Play ends when one player has one of each device aboard.
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, weil, 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). _________
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You've Just Got a Job in the Hatchery

You must use special words to describe what happens in a salmon's life cycle and to talk about your work. Here are some of those words. Use your dictionary to look up a definition for each one. Write down the definition, then write a sentence for each word, using that word to describe something that might happen in the hatchery.

egg

sperm

fertilization

spawn

alevin

fry

mature

incubator

Hatchery workers often talk about "tagging" fish. Tagging fish helps them learn where fish from their hatchery travel and where they are caught by fishermen. Look up the world "tag" in the dictionary. Now think about how you might be able to tag a fish. Write down your ideas!
Hatchery Basics

You've just been promoted to hatchery manager and you need to explain how a hatchery works to some new employees. Here is a diagram of the natural life cycle of pink salmon.

Then cut out the seven squares below. On another sheet of paper paste them in a circle that show the order of events in your hatchery during one year. Under each event write the name of the month or months in which the event described in the square might take place.

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<tr>
<th>Fry are counted, tagged and released to swim to the ocean</th>
<th>2-year-old fish return to hatchery, are captured and spawned. Fertilized eggs are put in trays with circulating fresh water.</th>
</tr>
</thead>
<tbody>
<tr>
<td>month(s) ____________________</td>
<td>month(s) ____________________</td>
</tr>
<tr>
<td>Fish leave incubators as fry and to to holding pens where they are fed</td>
<td>Incubators cleaned and readied for return of mature fish in fall</td>
</tr>
<tr>
<td>month(s) ____________________</td>
<td>month(s) ____________________</td>
</tr>
<tr>
<td>Eggs begin to hatch to alevins</td>
<td>Eggs mature enough to be handled, eggs sorted and put in large incubators</td>
</tr>
<tr>
<td>month(s) ____________________</td>
<td>month(s) ____________________</td>
</tr>
<tr>
<td>Eggs and alevins held in incubators</td>
<td></td>
</tr>
</tbody>
</table>
What are those Funny-Looking Fish?

The easiest way to identify fish and other living things is with a kind of yes/no system called a "key." The idea is to compare your fish with the two-part descriptions--body shape, number of dorsal fins, etc.--choose the one that fits best and follow the directions until you get the answer.

Study the parts of a fish in the drawing above. Then pick out a fish to identify. Start with 1a and 1b. Does the fish look round like a salmon? (Go to 2 and repeat the process.) Does it look flat like a halibut? (Go to 11, etc.) When you find its name, write it on the line. Continue until all are identified.

1. a) Body round.................................Go to 2
   b) Body flat................................Go to 9
2. a) 3 separate dorsal fins................Go to 3
   b) Less than 3 dorsal fins..............Go to 4
3. a) Barbel (whisker) on chin............Pacific (true) cod
     b) No barbel on chin...................Alaska pollock
4. a) 2 dorsal fins................................Go to 5
     b) Less than 2 dorsal fins............Go to 6
5. a) 2 separate dorsal fins that
     look alike................................sablefish
     b) Front dorsal fin high and narrow;
        rear fin long like a pointed ball......rattail
6. a) One small dorsal fin set far
     to rear..................................smooth lumpsucker
     b) One long dorsal fin, but
        different front and back................Go to 7
7. a) Front part of dorsal fin with
     sharp spinney spikes; back part
     smooth..................................Pacific Ocean perch
     b) One long dorsal fin, notched
        (like a "V") in the middle...........Go to 8
8. a) One lateral line and large mouth
     with big sharp teeth....................lingcod
     b) Several lateral lines; small teeth.....greenling
9. a) Flat fish with one eye on either
     side of head; winglike pectoral fins.....skate
     b) Flat fish with both eyes on one side
        of head..................................Go to 10
10. a) Eyes on right side of head only......yellowfin sole
     b) Eyes may be on either right
        or left side of head...................starry flounder

2. Theragra = beast food (for fur seal) chalcogrammu = brass mark. Brown back with silvery sides. To 3 feet. Now most heavily harvested white fish in Alaska waters.

3. Anoplopoma = unarmed gills fimbria = fringe. Grayish black or green. To 3 feet 4 inches. Next to halibut, most highly prized white fish; especially good smoked. (Also called black cod.)

4. Coryphaenoides = dolphin-like. Gray-brown with black-edged scales. To 3 feet 3 inches. Good eating (like cod) but found only in very deep waters.

6. **Sebastes = magnificent alutus = speckled.** Light red with speckles near tail. To 18 inches. Most sought-after rockfish for fillets (boneless steaks).

7. **Ophiodon = snake tooth elongatus = long.** Splotchy gray-brown and green. To 5 feet. Large size and fine flesh make this a prized sport and commercial fish.

8. **Hexagrammos = six line (lateral lines).** Green, brown, blue with spots. To 21 inches. Good food fish; found around rocks and reefs.

9. **Raja = skates binoculata = two-eyed.** Dark brown-gray to black. To 8 feet. Flesh in the "wings" delicious; tastes like scallops or crab.

10. **Limando = old man aspera = rough.** Light brown with yellow fins. To 18 inches. Stocks building back after heavy over-fishing by foreign fleets. (Called "long-nosed flounder" in Chukchi Sea.)

11. **Platichthys = flatfish stellatus = starry.** Dark brown with spots on fins. To 3 feet. Good flavor; firm texture. Most important flounder being caught in Alaska.
Gearing Up for Whitefish

What are whitefish?

Defining whitefish isn't easy, but one definition that can be used is...."all the white-fleshed finfish except the small bait fish, like herring or smelt, and perhaps excluding halibut." Because the definition says "finfish," that leaves out sharks, and because it says "white-fleshed," that leaves out salmon. Some people call whitefish "bottomfish" or "groundfish" which they really aren't, since only a few species spend their lives on the ocean floor.

What whitefish does include are all the flatfishes, and rockfishes, pollock, cod, black cod and lots of others. Instead of catching a few high value fish such as salmon, the whitefisherman must catch many tons of cod or flatfish, knowing that the price received for each fish will be low.

Whitefish have as many uses as there are different kinds of fish. In England and Northern Europe, these tasty fish are favorites on seafood menus. And they are beginning to catch on in this country, too. Some, like rockfish, red snapper and Pacific Ocean perch are sold in fish markets or grocery stores. Some, like cod, are cut up into small pieces and are covered with a coating or breading, and then used for fish sticks, fish and chips or fish sandwiches. Some are used for bait, and some find their way into fish fertilizers or pet food.

Government people involved in fisheries in Alaska hope more and more people and vessels will become involved in whitefish harvesting, but this may come about slowly. For one thing, many Alaskan fishermen would rather fish for salmon or halibut when the seasons are open. If these fishermen only fish for whitefish in the winter, when they can't fish for salmon or halibut, then the processing plants don't find it worthwhile to change all their equipment and people over to take care of these bottomfish for only a few
months out of the year. Another problem is that operating a fishing boat large enough to handle the many tons of whitefish a fisherman has to catch is expensive. Some Alaskan ports would have to be enlarged for deepwater ships. And whitefish have to be gutted immediately because otherwise, they spoil rapidly. Labor costs in America are much higher than in foreign countries. Gutting machines are available, but it's difficult to get them to fit the many sizes and shapes of whitefish. Many fishermen are not sure it makes financial sense for them to fish for whitefish. And not too much is known about whitefish ecology and biology, so it is easy to overharvest them. Plus, people across the United States need to learn about these fish so they will know how good they are to eat and will buy them. Then, if there are more people eager to buy these fish, fishermen will be able to sell more of their catch for a better price.

Don't be too surprised, however, when sooner or later Alaskan fishermen come up with solutions to these problems. In recent years, Alaska's old standby fisheries have become increasingly crowded. Limited entry laws have cut down on the number of salmon fishermen, and shortened seasons for crab and shrimp have left many boats idle for much of the year. Already, there are many different ways in which whitefishing is now being tried in Alaska, including some cooperative fishing with vessels from other nations.

1. Name three kinds of fish that might be called whitefish.

2. Name two kinds of fish that are NOT whitefish.

3. List the uses for whitefish.

4. List at least four problems in the development of the whitefish industry.
5. How would you solve these problems in the development of the whitefish industry?

6. The Pribilof Islands may be one site of future whitefish development. Can you find them on a map of Alaska? Where are they? Until recently, the Aleut people on the islands have lived a subsistence lifestyle, depending primarily on a federal government-supported fur seal harvest for their yearly income. Those funds are being cut off and islanders are looking for new sources of income. One possibility is the development of a deepwater port and fish processing plants for whitefish. Some local people are worried about the changes in their lifestyle and the effects on the huge colonies of seabirds and marine mammals that live on and around the islands.

What changes do you predict will happen on the islands if the whitefish industry is developed?

How do you suggest the local people handle this development?