ALASKA Tidelines

Vol. 1, No. 5 A University of Alaska Sea Grant Publication for Alaska Schools February, 1979

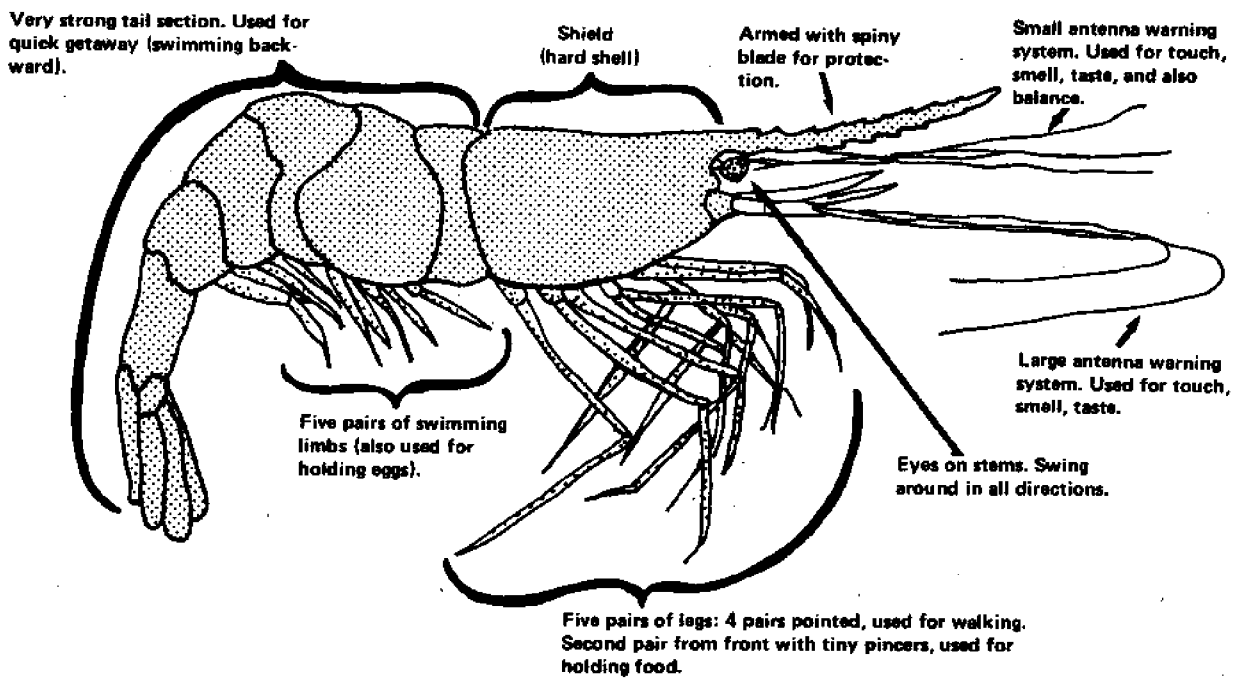
WANTED

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.

ALASKA'S Hide and Seek Shrimp

The Facts of the Case:

Since its early beginnings about 100 years ago, the North Pacific pink shrimp fishery has grown to become one of the richest in the world. In Alaska alone, shrimp landings have soared from about 8 million pounds in 1958 to 120 million pounds in 1974. Then, for some reason, the shrimp began to disappear.

Why?

"Simple," you might say. "We caught too many. We fished them out."

Maybe so. But then again, maybe not. While estimated shrimp populations off the Alaska Peninsula fell from 300 million pounds in 1974 to 100 million pounds in 1975, biologists aren't a bit sure that the drop was due to overfishing. It was true that there were far less shrimp in areas that had been heavily fished. But the puzzling part was that shrimp stocks were also way down in areas where there had been no fishing at all.

Limits on how many shrimp could be taken were set by the Alaska Department of Fish and Game, whose job it is to manage the fishery. But still the shrimp continued to decline.

The year 1977 was a disaster. Only 18 million pounds of shrimp were taken in the prime Kodiak, Chignik Bay and South Alaska Peninsula areas before management closed down fishing for fear of further depleting the stocks. And 1978 wasn't much better.

What had happened to Alaska's pink shrimp? Where had they gone?

The Puzzle:

Research is like a jigsaw puzzle where you try to fit pieces of information together to get the whole picture. If some of the pieces are missing, you look for them even in the most unlikely places.

In this case, some very unusual research is being directed by scientists at the University of Alaska's Institute of Marine Science (IMS) and funded by the Alaska Sea Grant Program. They're not just looking in the water for clues to the pink shrimp puzzle. They're looking at the sky!

Anyone who has been on the Gulf of Alaska in a storm knows that the wind has a lot to do with the size of the waves. But even on calm days there is an interaction between the air and the sea. Currents in the ocean are like the winds in the atmosphere. And like the air, water can have its "weather," too, with changes in temperature.

There are always small variations in weather patterns, of course. But the 1970s have been marked by two distinct weather cycles over Alaska and the North Pacific – both in the air and in the water. The years 1971 through 1975 were unusually cold, and since 1975 it has been unusually warm.

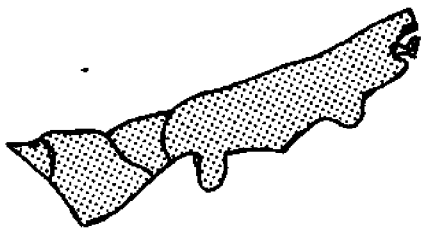
Since a general change of only a few degrees in water temperature can affect the movement and development of marine life, those weather cycles set scientists to wondering. And researchers are now digging back into data on past weather patterns and ocean temperatures to see if they might be linked in any way with the rise and fall of Alaska's pink shrimp fishery. Experiments also are being conducted at IMS laboratories in Seward to find out how shrimp react to warmer or cooler water.

The Pieces:

It all adds up to a lot of odd-shaped pieces. But as you read, see if you can figure out how some of them might fit together:

Air Weather: From 1971 through 1975, the upper air flow which affects Alaska's weather was mainly from the north. These "steering winds" at about 10,000 feet aloft brought cold air down from the Arctic and Siberia. Then in mid-1976, this upper air flow shifted around to the south, bringing unusually warm air.

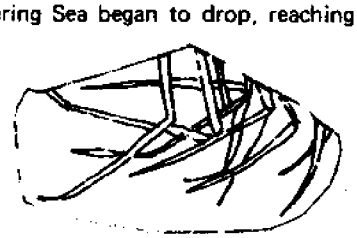
Water Weather: In 1971, water temperatures in the Gulf of Alaska and the Bering Sea began to drop, reaching a low of a little over 2°C (about 3½°F) below normal in 1975. Then suddenly the water temperature began to rise. The whole North Pacific Ocean was warmer than usual in 1977, and in 1978 the sea surface temperatures in the Gulf of Alaska were 2° to 3°C (3½° to 5½°F) above normal.



Shrimp Catch: The Kodiak Island fishery, which traditionally makes up a major portion of Alaska's pink shrimp catch, peaked at 82 million pounds in 1971. By 1975 the catch had dropped to 46 million pounds, and by 1978 to 21 million pounds.

Shrimp Biology: Much is still to be learned about how just a few degrees difference in water temperature can change the life cycle of the pink shrimp *(see page 3)*. Biologists have found that they seem to spawn earlier and carry their eggs longer when the water is cold. But any extremes can spell trouble. In 1971, for example, females were found to be having trouble keeping their eggs. When the water is warm, shrimp grow faster and mature earlier. Speeding up the growth rate, however, could throw off the balance of males and females which is necessary for a healthy population.

Movement: Although Alaska's pink shrimp are not known to migrate as many fish do, it is possible that they leave traditional areas to seek out cooler water. However, changes in the water climate might also bring in an abundance of fish that feed upon the shrimp, such as pollock, cod, flatfish and salmon. In 1978, for example, great numbers of pollock were reported in the Kodiak area.



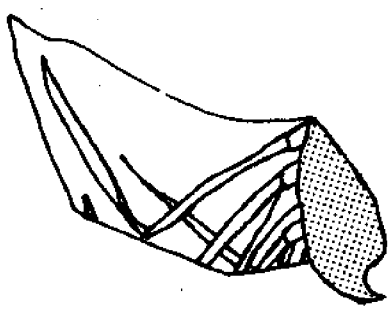
The Big Picture:

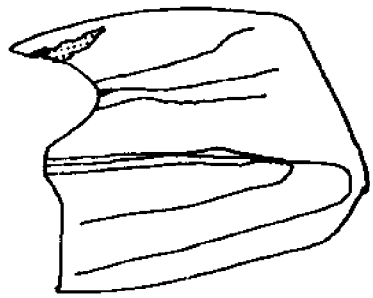
If you could put all this together and get the big picture, what would you do with it?

"We're trying to dial as much data as we can into the management plan so that we can get the most out of this resource without destroying it," Dr. Henry J. Niebauer, who is directing the physical oceanographic side of the research, told *Tidelines.*

"The fishermen originally asked for help because they thought there was more to the pink shrimp problem than just biology. So we're trying to chart long-range changes in the temperature and see how these might relate to the biology of the shrimp.

"For example, if we could find a strong relationship between the mean (average) temperature and a good year





for shrimp or a bad year for shrimp, then we'd know what was coming up two or three years ahead of time. And if we figured a bad year was coming up, we could say, 'Hey, maybe we ought to lay off shrimp this year and fish for something else.'

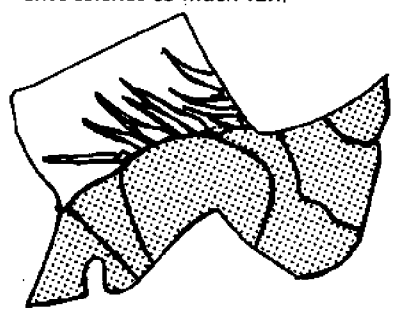
"Or if we could relate monthly mean temperatures to how shrimp react biologically — what happens to their growth, whether they migrate or not — it would tell us much more. But we're still a long way from that.

"On the other hand, we might find that the problem is something completely different. It could be that shrimp just naturally go through high and low population cycles, as was found to be true with some of the Bering Sea crab.

"And, of course, when you consider the number of big modern vessels that are fishing for Alaska's pink shrimp and the sophisticated gear they are using — well, perhaps the answer *is* just plain over-fishing."

Then why, *Tidelines* asked, are the shrimp still disappearing in the offshore areas that have never been fished?

"It's a puzzle," Dr. Niebauer agreed, but he added: "But that's what makes science so much fun."



Trace the puzzle pieces on these pages. Then cut them out, fit them together, and paste them down. What do you find? Well, you can use the cover poster for a model and draw in the missing piece. And that, for now, will put you one jump ahead of the scientists.

READ ON:

"Alaska's Fishery Resources: The Shrimp," by Louis Barr, U.S. Fish and Wildlife Service, Fishery Leaflet 631, 1970. (Cover sketch reprinted by permission.)

The Strange Life History of *Pandalus borealis*

There is more to the description of *Pandalus borealis,* alias pink shrimp, than is shown on the cover poster. Much depends on the stage of life you catch him/her in, as you will find as you read this life history. (All pink shrimp go through the following stages of growth. But the timing may vary in different water temperatures.)

September/October — Females molt (change) into a special shell designed to carry eggs. Eggs are spawned.

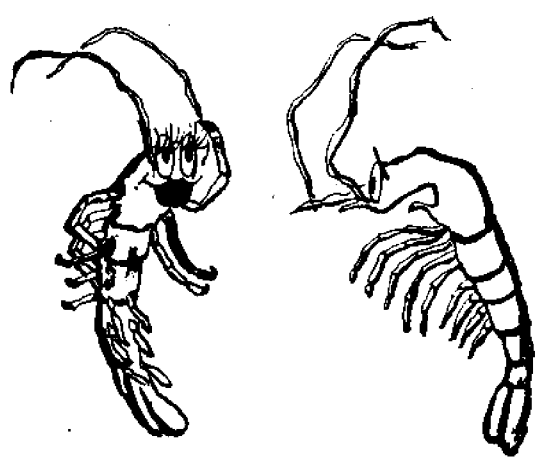
Next 5 to 6 months — Attached to spawning shell by tiny hairs between the swimming limbs *(see cover)*, eggs are carried by the female for about six months.

March/April — When eggs are ready to hatch, female stands on sea bottom and vigorously fans her swimming limbs. The larvae (baby shrimp) are washed out of the eggs and drift away in the current. They are now on their own.

July — By now the larvae have molted up to six times to allow for their rapid growth. They enter the post-larvae stage and look like small-scale adult shrimp.

2nd to 3rd year of life — Feeding on worms, small shellfish and dead fish or animal matter, the shrimp grow to the size of two to three inches. But surprisingly, all of them are males.

3rd to 4th year of life — The male shrimp gradually turn into females. This takes place through a series of molts, which usually begins in March or April and ends in August or September.



(Maine Commercial Fisheries)

"What's come over you lately, George?"

5th to 6th year of life — Once the sex change is completed, the shrimp remain female for the rest of their lives. Thus, the shrimp population is maintained by young male shrimp and older female shrimp.

How to Make A Waterdrop Microscope

By Sigmund Kalina

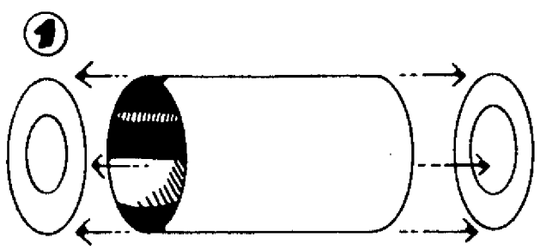
This is for everybody who didn't get a microscope for Christmas.

Although a good waterdrop microscope will only magnify about 100 times as compared with the 440x of a student's compound microscope, you'll still be able to explore an exciting "mini-world."

The materials you will need for making a waterdrop microscope are:

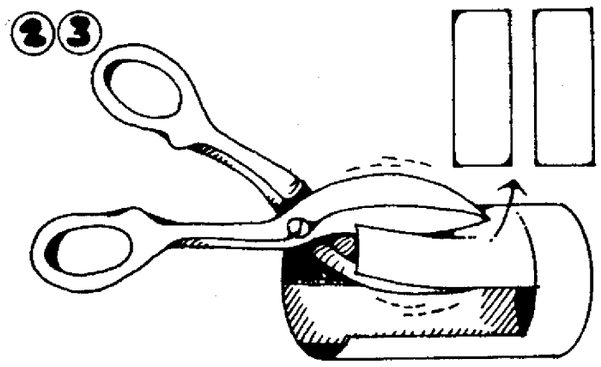
- Scissors or tin snips.
- Can opener.
- Hammer.
- Small nail or carpet tack.
- Tin can.
- Block of wood, 2x6x8 inches.
- Metal file.
- Sheet of glass, 6x12 inches.
- Pocket mirror.
- Two-inch cube of clay or small wooden block.
- Sharpened pencil.
- Glass of water.
- Stack of books.

Adapted from "Science World," Jan. 26, 1978, Scholastic Magazines, Inc., and reprinted by permission of Lee Kalina.



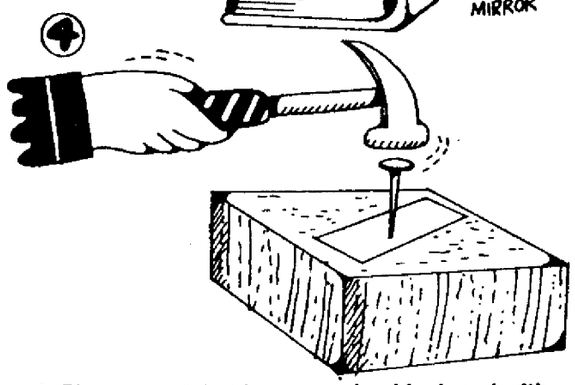
Now, do the following:

1. With a can opener, remove top and bottom lids from can.

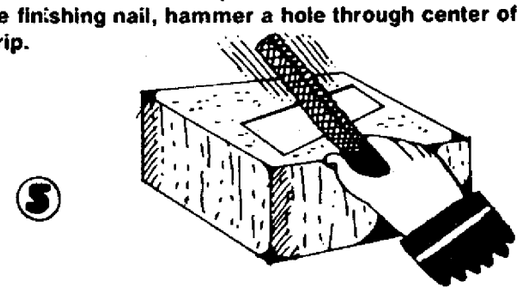


2. Take snips or scissors and cut metal can *lengthwise*.

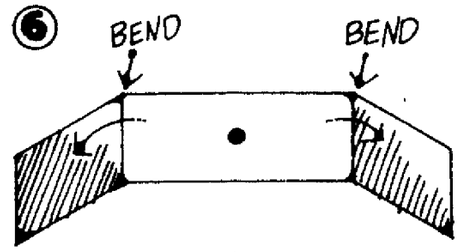
3. Cut flattened metal sheet into several strips measuring about 2 x 4½ inches



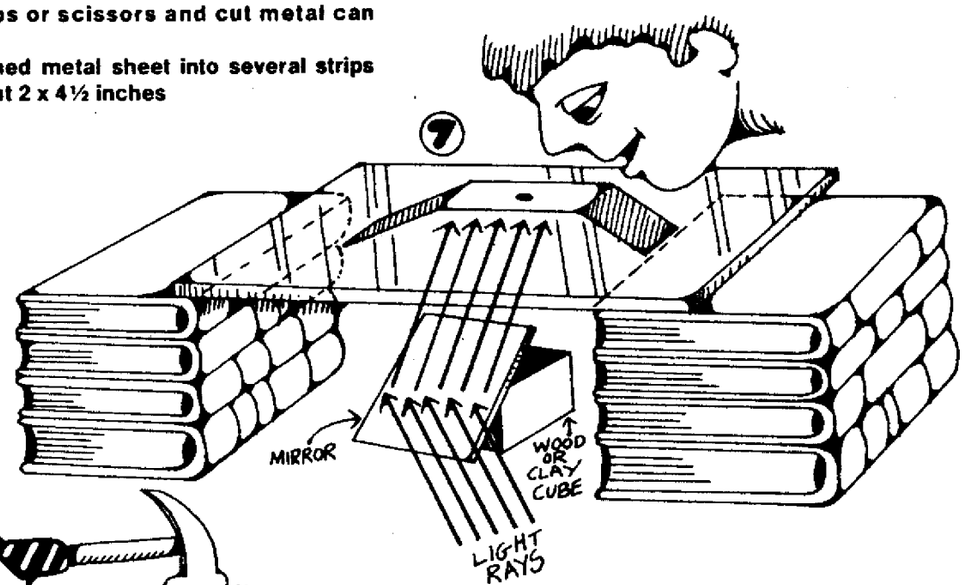
4. Place a metal strip on wooden block and with the finishing nail, hammer a hole through center of strip.



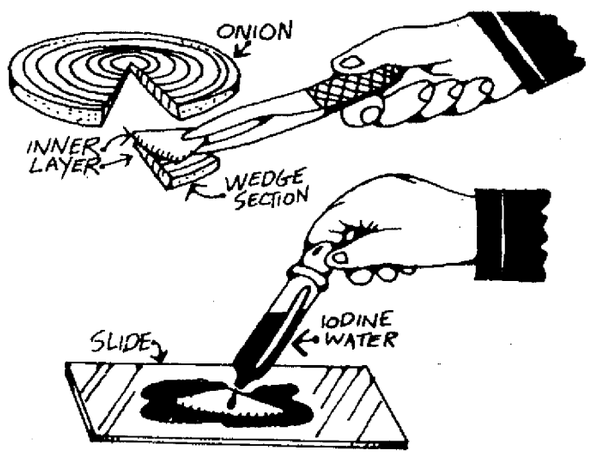
5. Insert nail through hole again to round out opening. File all rough edges smooth.



6. Bend metal strips as shown in illustration.



7. Make 2 piles of 4 books each. Span a sheet of glass across the stacks. Position the mirror beneath glass. See illustration.



Arthur Friedman

HOW TO USE THE MICROSCOPE

Place microscope on a desk or table near a good source of light (lamp or window). Adjust the mirror to reflect the light upward through the glass.

Dip sharp pencil point into water. Shake off large drops. With pencil, place a large drop of water over the hole. Be sure the drop is centered and rounded.

Place material to be viewed on glass pane. If specimen is solid, spread out a very small amount. If it is liquid, use one small drop. Position metal strip with water drop centered over specimen.

Hold your eye close to the center hole with the water drop. Press your finger down on the metal strip. This will focus the specimen into view.

Some helpful hints: If you have difficulty getting a rounded drop of water, add more water to the drop, or start over again. The drop tends to evaporate after a few minutes. To help keep the drop rounded, try polishing the rim with automobile wax or other metal polish.

Remember that the specimen must be *thin* enough to let light pass through.

HERE ARE SOME MATERIALS YOU CAN EXAMINE:

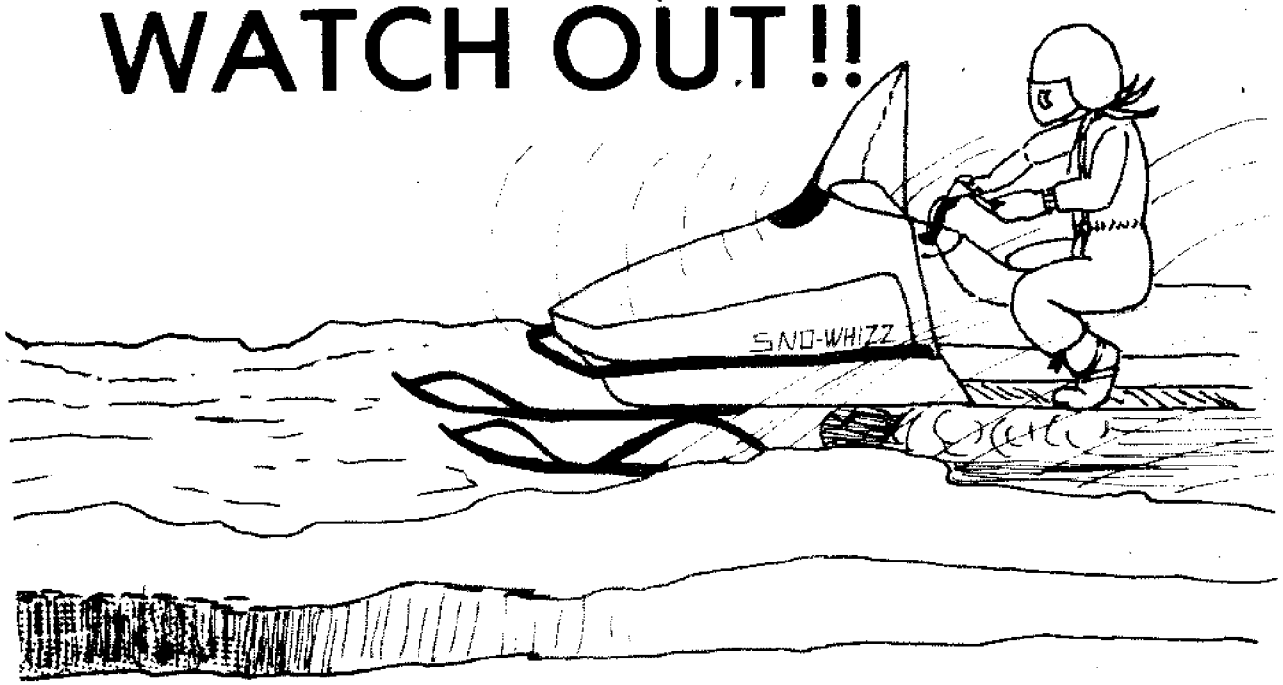
Fill a quart-sized jar or plastic container with water from a pond, stream, tidal marsh, or estuary (place where a river meets the sea). Include some weeds, leaves or grass and some mud from the bank. Cover with cheesecloth or gauze and let it stand for several days to a week. Use a medicine dropper to transfer material onto the glass for viewing. (Most microorganisms — living things of microscopic size — will be found near the surface of the water.)

Examine onion-skin cells. Cut out several wedges or rings in 1/2-inch sections from a small onion. Remove the thin inner transparent layer with a pair of tweezers or your fingernails. Spread it on a slide and stain it with a drop of iodine or food coloring mixed with water *(see illustration).*

Try examining a human hair, salt or pepper, fish scale or a shrimp antenna. Take it outside where it is cold and try a snowflake!

Spring Ice

WATCH OUT!!



The days are getting longer and Alaska is warming up. Makes you want to spend more time outdoors on skis, skates, snowshoes and snowmachine, or just generally soaking up the sunshine.

But remember that the frozen lakes, rivers, marshes and inlets are soaking up that sunshine, too. Before breakup, the ice can become soft or "rotten" in spots. And places where you walked or drove your snowmachine just a week or two ago could give way beneath you without a crack of warning.

Rotten ice is also called "candle ice" or "dark ice." Long shafts form like bundles of candles stretching down through the ice which make it look checkered or "honeycombed" on the surface. This ice is usually dark blue in color, and it wouldn't be hard to see except for the fact that it is often hidden by an insulating layer of snow. So when you're out on the ice in late winter or spring, you should always act as though it *might* be there.

To help you avoid an icy bath – or worse, here are some spring ice safety tips from the people who know at the Alaska Department of Fish and Game:

- Never go out on the ice by yourself. Always have someone with you.
- When traveling on a frozen lake or over other deep water, each person should carry an eight to ten-foot pole or a length of rope. And don't walk too closely together. Then if one person breaks through, the other will be able to help.
- If you are wearing snowshoes or skis, don't fasten the bindings around your feet. Instead, just slip the toe of your boot or mukluk through the strap or binding. Then if the ice gives way, you won't have to fight a pair of snowshoes or skis under water.
- The same goes for a backpack. Slip your arms out of the straps and let the straps hang only over your shoulders.

Overflow Danger

Another hazard to watch out for on the ice is "overflow." Overflow is water that has been forced up through a break in the ice. This too is often covered by a layer of snow. Be on the alert for any unusual markings in the snow, especially sunken lines leading out from a central point.

Running into an overflow can happen very quickly when you're tooling along on your snowmachine. It may not be as bad as breaking through into deep water, but if you're far from home wet feet can quickly turn into frozen feet. So play it safe and remember these rules:

- At this time of the year, stick to trails as much as possible. A well-run trail is usually packed down and there is less chance of a hidden overflow.
- If you feel something "different" – like your machine dragging down – turn around and get out of there as quickly as possible.
- When traveling across a lake in the company of other snowmachines, have one machine lead the others by about 100 yards. If the first machine runs into an overflow, the rest will be far enough back to avoid it – and to help.

(Getting a snowmachine out of an overflow is a difficult job because slush and ice quickly form in the tracks. If the machine won't move under its own power and you can't push or pull it out, get some small logs or branches and shove them under the tracks and skis. It's also a good idea to turn the snowmachine on its side and pound the tracks to knock out the slush and ice. By the next day the exposed overflow probably will have frozen over, and you will be able to drive your machine to safety.)

- On long trips, always carry matches and extra socks and boots. If you get wet, head for shore immediately. Build a fire and get out of those wet boots and socks and into dry ones. Do this even if you have to leave your machine on the ice. It won't do you much good with both feet frozen.

Adapted from "Spring Ice Safety Tips," by Rupert E. Andrews, Director, Sport Fish Division, Alaska Department of Fish and Game, in "Fish Tales and Game Trails," January/February issue, 1978.

Career Corner:

Meet Millie Mackey

From the looks of the spotless laboratory at Pan Alaska Fisheries in Kodiak, you might get the idea that seafood quality control is all white aprons and test tubes and microscopes. Not so.

For Millie Mackey, quality control begins down on the docks in the wind and rain, with seagulls wheeling and crying overhead. She is there to meet the shrimp boats, checking out the color, odor and freshness of the catch before it's even unloaded. And she will take a sample off the very top back to the lab for testing.

Alaska is proud of the excellence of its seafood products. Millie's job as Pan Alaska's quality control manager is to make sure that high standards are maintained all the way along the line — which, of course, begins with the boat and the fishermen.

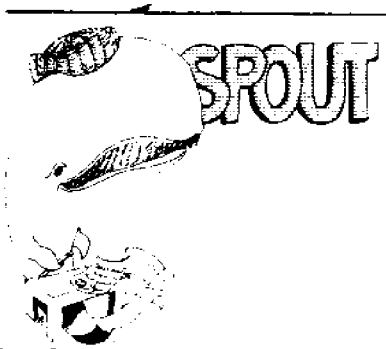
"You can tell right away if the shrimp have been well iced and taken care of properly," she told *Tidelines*. "If you start with a clean boat, follow that up with a clean plant, and back it all up with good lab testing, you will have a clean wholesome product."

Pan Alaska's modern processing plant seems light years away from the first small shrimp cannery that opened in 1915 near Petersburg in Southeast Alaska. At that time shrimp were often cooked aboard the fishing boats and had to be shelled and picked by hand.

Shucking pink shrimp is pretty slow going. So the industry didn't really begin to expand until 1957 when the first automatic shrimp peeler was set

(Photo by Fran Sweet)

(Continued on Page 8)



Dear Spout,

Has anyone done any research on blackfish? Could you answer some of these questions *(see below)*? Thank you.

Mrs. Ferguson's Reading Class
Kasigluk High School

Dear Class:

Here are answers to some of your questions:

Q. How come blackfish have no scales?

A. Blackfish do have scales; they are small and deeply embedded in the skin.

Q. Why can they live without water for two or three days?

A. They can live under conditions of very low oxygen. When they are out of water under cool conditions they take some oxygen from the air through the skin and maybe through their gills.

Q. Why does it puff up its stomach?

A. Blackfish do not puff up their stomachs. What happens is that in some areas, particularly around the place where you live, the tissue of some blackfish starts taking on fluid in late winter. This condition is called *edema*. It is associated with very low amounts of dissolved oxygen in the water at that time of year.

Q. What kind of food do they eat?

A. Blackfish are primarily insect eaters. If you keep blackfish in an aquarium they won't eat anything that is not alive.

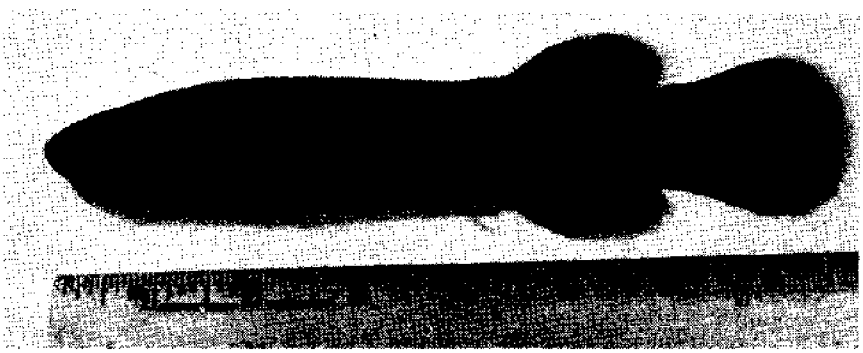
Q. Can they be frozen and live?

A. The surface of the fish can freeze and it can still live. However, the fish dies when it is completely frozen.

Q. Are they prehistoric?

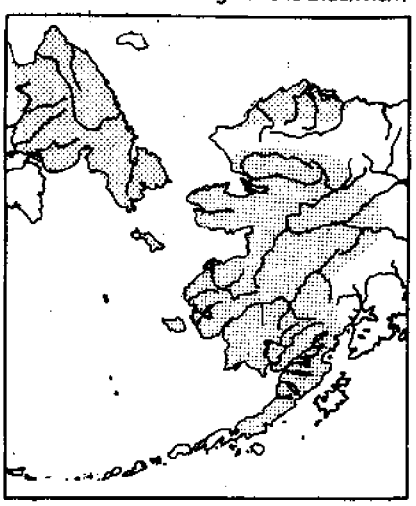
A. Blackfish are not an ancient or primitive fish. They evolved after the salmon, herring and whitefish families. They are closely related to the pike family.

ALASKA BLACKFISH



(Photo by John P. Doyle)

Q. What's the range of the blackfish?



Range of Alaska Blackfish

Spout

March issue — The Whales Return

MEET MILLIE . . .

(Continued from Page 7)

up at Wrangell, providing a much faster and cheaper way to handle the shrimp.

After that, the industry spread rapidly to Cook Inlet, the Kodiak Island area, along the Alaska Peninsula, and all the way out to Unalaska. The shrimp fishing fleet kept pace, with modern electronic gear and sleek steel vessels that are able to carry up to a quarter of a million pounds of shrimp in their holds. And today, huge peelers and other mechanical equipment have brought Alaska's total processing capacity to around 120 million pounds of shrimp a year.

Typical of these modern processing plants is Pan Alaska's frozen shrimp operation. From the time the shrimp are fed into the first wash, they go through a series of automatic peelers, cleaners, washers, cookers and graders until they finally come out the other end, sealed in plastic and fresh frozen for the market.

"It's a 'no hands' operation all the way until they reach what we call the 'pick belt' before the final wash," Millie explains. "That's where everything that is not a shrimp is picked out. But there, too, sanitation is very strict."

Millie's concern about cleanliness doesn't stop with what comes out of the water. She also worries about what goes back in.

Part of her job in quality control at Pan Alaska is checking the waste water that is discharged back into the harbor to make sure it is well within the standards set up by the Environmental Protection Agency (EPA). "We're all interested in keeping our waters clean," she says.

Millie was born and raised in California where she was a lab technician for 25 years with a pharmaceutical (medicines and drugs) firm. She came to Alaska eight years ago and worked first in quality control at an Anchorage dairy products company before moving to Kodiak where her husband is now district attorney.

What are the job opportunities in quality control?

"Terrific," says Millie. "We need more quality control people now than ever before. Not just because the standards are so strict, but because it's so important to the Alaska seafood industry – and to all of us."

Here and There

(Starred (*) words are based on information in this issue.

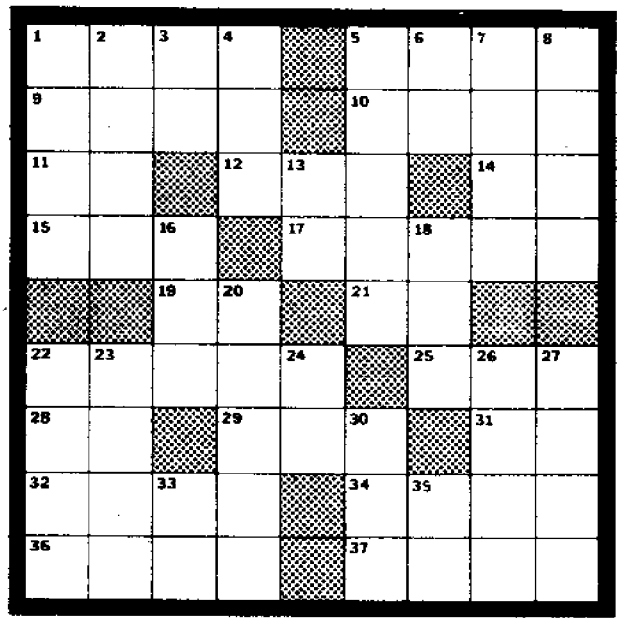
ACROSS

*1. Shrimp seem to spawn earli- and carry their eggs longer when the water is____.
*5. But they seem to grow faster when the water is____.
9. Alaska Native Arts and Crafts (init.).
*10. Last year great numbers of pollock were found in the Kodiak ____.
11. Sea level (abbr.).
12. You use this to hit a home run.
14. Aleutian Islands (abbr.).
*15. This part of the shrimp can swing around to look in all directions.
*17. Scientists still have much to ____about how water temperatures affect the life cycle of the shrimp.
19. An added message at the end of a letter (init.).
21. Railroad (abbr.).
*22. ____ fish can live with very little oxygen.
25. Angry.
*28. University of Alaska.
*29. Shrimp larvae usually come out of the ____ in March or April.
31. Short for mother.
32. Stanley's friends call him ____.
*34. It is possible that shrimp stocks have dropped off because of____-fishing.
*36. Part of the title of this puzzle.
*37. Pandalus borealis is commonly known as the____ shrimp.

DOWN

*1. Before you try to solve a mystery, it is wise to (17 across) the facts of the ____.
2. The one and____.
3. Sixth note of the musical scale.
4. The letters of the alphabet between A and E – backwards.
*5. There is "weather" in the ____as well as in the air.
6. Alaska Range (abbr.).
*7. One snowmachine should lead and the others follow in the ____to avoid the dangers of overflows.
*8. In Alaska, the pink species makes up the____ portion of the shrimp pack.
13. Short for Albert.
*16. This agency sets anti-pollution standards (init.).
*18. When traveling on spring ice across deep water, pull each ____out of the straps of your backpack.
*20. The introduction of automatic shrimp peelers helped shift the____of major processing from Southeast Alaska to the North Gulf coast.
22. Remote areas of Alaska are sometimes called the ____.
23. Not early, but ____.
24. Keg (abbr.).
26. Said at the end of a prayer.
*27. Rotten ice is usually____blue in color.
30. Nickname for the Republican Party (init.).
33. Alaska Railroad (abbr.).
35. Roman numeral for 6.

(Answers in March issue.)



December-January X-Word Answers

Alaska Tidelines is published by the University of Alaska Sea Grant Program. **Donald H. Rosenberg**, Director. The program is funded by the Office of Sea Grant, National Oceanic and Atmospheric Administration, U.S. Department of Commerce, and by the State of Alaska. **Alaska Tidelines** is published once a month during the school year and distributed free to all Alaska Schools requesting it.

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