ALASKA Tidelines

Vol. I, No. 1 A University of Alaska Sea Grant Publication for Alaska Schools September, 1978

AQUA (water) + CULTURE (cultivate) =

Photo by Judy Wohlfrom

Welcome to Tidelines

The marine life of Alaska's waters is probably as rich and varied as anywhere else in the world. This wealth is part of our heritage. But we must understand it before we can properly use and protect it.

With this goal in mind, the University of Alaska Sea Grant Program begins publication of *Alaska Tidelines*, written for Alaska students, about Alaska resources. It will be published once a month through the school year, and will be distributed free to all schools requesting it.

October issue: The Monster Mystery of Iliamna Lake.

How's your Latin?

Like many of our words, "aquaculture" comes from the language of the ancient Romans. You have to allow for a few changes over the past 2,500 years, but in Latin it worked out like this:

aqua (water) + cultis (cultivate) = aquaculture.

Now you try it. Use a little imagination and see if you can figure out what this word is:

ager (field) + cultis (cultivate) = _____.

Why do you think we have come to rely so much on farming the land for our food supply? Do you think it's time we tried to start farming the sea? Why or why not? The articles in this issue of Alaska Tidelines *may help you make up your mind.*

ALASKA SALMON: Can

The salmon are back! First there were just a few, milling around behind the hatchery pens on Indian River. Then a few more. Then suddenly the still waters of Sitka Sound seemed to come alive with fish. After two years at sea, the first "graduates" of the aquaculture program at Sheldon Jackson College had come home.

Salmon is one of Alaska's most valuable fisheries. And each year Alaskans are glad to see them return as they always have – to spawn (lay their eggs) in the rivers and streams or intertidal waters of their birth. But that July 14, 1977, was a red letter day for the students and teachers at Sheldon Jackson in Southeast Alaska. Because these fish were coming back to an "unnatural home."

These Pink salmon had been artificially spawned with eggs and milt (sperm) taken from fish from another river. Instead of starting their lives in a gravel stream bed, they had been hatched in stacks of incubator trays. Then they had been carefully raised to fingerling size, and turned loose to spend their adult lives in the vast feeding grounds of the North Pacific Ocean.

Whether or not they would return to this strange hatchery setting was anybody's guess. But there they were – fat and mature and heavy with eggs and milt, ready to bring life to a new generation, and then to die, as they always do within a few days of spawning.

Not only had the fish returned, but they were back in record numbers. Their arrival touched off a frenzy of activity. Eggs were taken to provide hatchery brood stock for the next Pink salmon cycle. Fish were sold to commercial seafood companies to bring money for hatchery expansion and operating expenses.

Still they came! Word was sent out on the radio and in the newspaper inviting the people of Sitka to take all the fish they could use. (Spawned-out salmon are not all that good for cooking fresh – but they are fine for smoking.) Mature fish were even loaded into pickup trucks lined with plastic and filled with water and hauled around high waterfalls which blocked their passage to a natural spawning ground on the upper Indian River.

Of the two million fry that had been released two years before, more than 100,000 had survived the many hazards of life at sea (see pages 4-5). Even for a natural run of Pinks, a return of one to two percent is considered excellent. This was a return of more than five percent!

Photo by Jon R. Nyberg

Student Cleo Klemzak has worked in every part of SJC's aquaculture program from laying water pipes on up. Here she checks one of the first returning salmon for ripeness.

What is Aquaculture?

Like the word itself, aquaculture is not new. Down through the centuries, people have tried their luck at cultivating – or farming – aquatic plants and animals. As early as 475 B.C. a gentleman by the name of Fan Li raised carp in small freshwater ponds in China. Trout farming began in Europe in the 15th Century. And today, aquaculture in one form or another is practiced all over the world.

Shrimp are penned and raised in the backwaters and estuaries of such far distant places as the South China Sea and the Mediterranean Sea. Salmon, trout and even catfish are cultivated in the U.S., Canada, Russia, Spain, and many other countries.

In the island nation of Japan, everything from eels to seaweed to salmon to shellfish is farmed. Oysters, scallops, clams, and mussels are cultivated on neat hanging underwater racks and lines, well out of reach of seabottom predators. And the network of salmon hatcheries which Japan has developed over the past 100 years recently yielded a harvest of Chums that was greater than the natural Chum runs of Alaska.

In aquaculture, the "farmer" controls the elements that are vital to the growth of marine life: light, shelter, weather, oxygen, waterflow, and food. The "crop" is protected from disease and from other animals that might prey upon it. Under ideal circumstances, the survival rate increases, the growth cycle is speeded up, and healthy fish are produced.

It takes solid scientific knowledge, however, to determine just what these ideal circumstances might be. Care must be taken not to tip the delicate balance of food and life support systems in the sea by building up one species at the expense of others. Inferior stock should not be turned loose to interbreed with, and weaken or disease natural runs of fish.

You Farm A Fish?

Salmon in Alaska

Throughout history, the five species (kinds) of Pacific salmon (see page 6) that breed in the freshwater rivers and lakes of Alaska had been a major source of food for its Native people (see page 7).

But it wasn't long after Alaska was purchased from Russia in 1867 that U.S. fishermen discovered this vast fishery too. Eleven years later the first commercial canneries were built, and as demands for the salmon increased the runs began to decline. The idea of rearing salmon in hatcheries was fairly new, but cannerymen decided to give it a try as a way of increasing the fish supply without cutting back on their profits.

Everything seemed to go wrong. At Fortman in Southeast Alaska – called the largest salmon hatchery in the world – millions of eggs were wiped out by heavy rains and early freezes. Such predators as sculpin and Dolly Varden trout gobbled up young fry. And at one time a volcanic eruption of Mt. Katmai smothered Kodiak Island hatchery pens under a load of ash. While most failures were due to such errors as overcrowding, crude equipment, bad water, and just a general lack of know-how, salmon aquaculture in Alaska was given up as hopeless. And in 1935 the last hatchery closed down.

Since then, scientific management has been used to try to rebuild the salmon runs. Certain kinds of gear were outlawed, catches were limited, and areas were closed to fishing at certain times of year. But still the salmon continued to decline. By the 1970s, the once abundant Pink and Chum runs were down by about half, and the prized Bristol Bay Reds had slumped disastrously. Something had to be done.

So Alaska has turned once again to aquaculture – but this time with more knowledge, care, and caution. In 1972 a special division was created within the State Department of Fish and Game for fisheries development, and two years later a law was passed allowing for private ownership and operation of salmon hatcheries by qualified nonprofit organizations. Such organizations can be made up of fishermen's groups, like the pioneering Prince William Sound Aquaculture Corporation, or individuals, or even colleges like Sheldon Jackson and high schools at Sand Point and Kake.

Will it help? It's too early to tell. Only eight permits have been issued so far, and of that number, only three have released salmon fry. But Alaskans have high hopes. And if aquaculture works for salmon, who knows? We may soon be farming oysters, or scallops, or shrimp, or any one of the hundreds of Alaska's rich renewable resources of the sea.

READ ON:

Salmon Rancher's Manual, by W.J. McNeil and J.E. Bailey, NMFS, 1975.

History of the Marine Hatcheries of Alaska, by William R. Hunt, 1976.

This issue of **Tidelines** was reviewed for scientific accuracy by Mel Seifert, Director, Sheldon Jackson College Aquaculture Program, and by A.J. Paul, University of Alaska, Institute of Marine Science, Seward Station.

CAREER CORNER: Meet Eric

Eric Jordan has fished the waters of Southeast Alaska ever since he was a kid helping out on his Dad's and Mother's troller. After he graduated from high school he went to Oregon State University and got a degree in Health Education. Then he came back to Alaska and taught at a junior high school in Juneau for a while, but his heart was really back on the water – and not necessarily with fishing.

"We were all worried about the salmon declining," Eric told *Tidelines*, "and 1975 was one of the worst years in Alaska's history, certainly in Northern Southeast. I am basically a conservationist. So instead of just pulling salmon out, I wanted to help put some back in."

Eric decided to enroll in the Aquaculture Technology Program at Sheldon Jackson College in Sitka, the only one of its kind in the state. Even though he was older than most of the others in his class and had a college degree, it wasn't any cinch. "I wasn't the best student – not by any means," he says.

The course included technical skills, fisheries biology, and "on-the-job" training. And Eric praises the quality of teaching and the way faculty and students pulled together. When he received his two-year certificate as a hatchery technician last year, he got a job helping with the organization of a new fishermen's aquaculture association for the northern Panhandle area. If all goes well, he has a good chance of working at the hatchery once it is built.

What other jobs are there in aquaculture? Not too many right now, since the program is so new. But as it grows, it could add from 30 to 100 jobs a year for trained technicians. Do you think it's a good field for you?

Life Cycle of a Pink Salmon

Even though the Pink salmon is the smallest of all the Pacific species, it is a favorite with the beginning aquaculturist because it has the shortest life cycle. That means, of course, the ocean rancher gets an early return for all his effort.

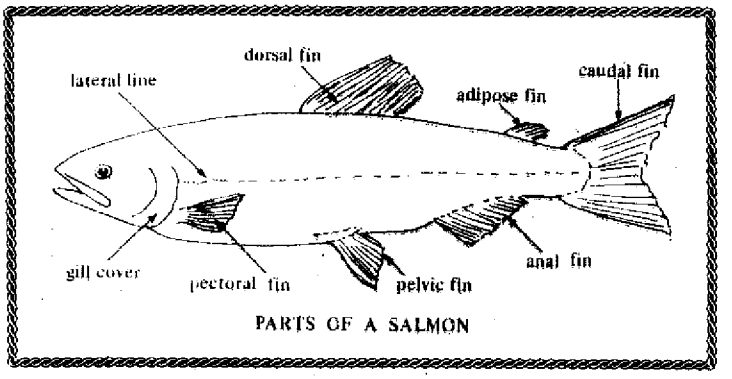
Each species has its own special pattern of living which affects its growth and its size at maturity. The mighty King may spend five to six years at sea and then travel 2,000 miles up the Yukon to spawn. Reds and Silvers may linger two or three years in lakes and rivers before heading for saltwater. But all share that important homing instinct — and all share a life of perils as you will see when you play this game.

1. Roll a die to move ahead, and follow the instructions in the space on which you land. (If you don't have a die, flip a coin. *Heads* move ahead one space; *tails* move ahead two spaces.)
2. One throw per turn. The first one back to the home stream wins.

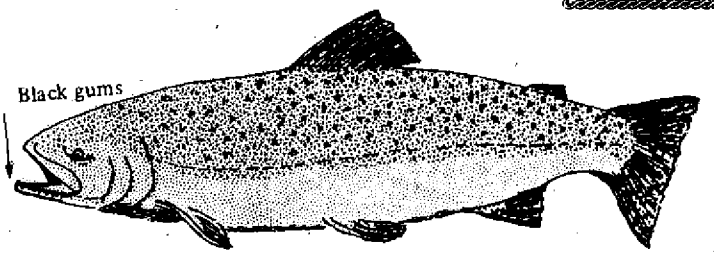
(Adaptation of a game by Mr. Charles Larson of Kake School, Kake, AK.)

SALMON OF ALASKA

(Species Chart)

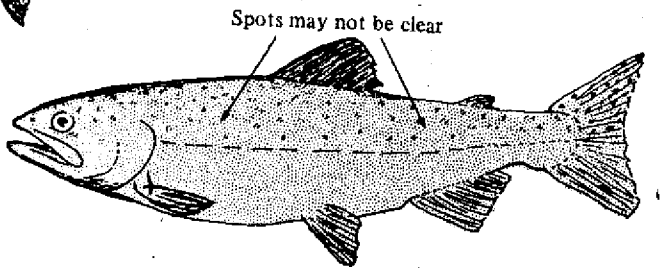


PARTS OF A SALMON



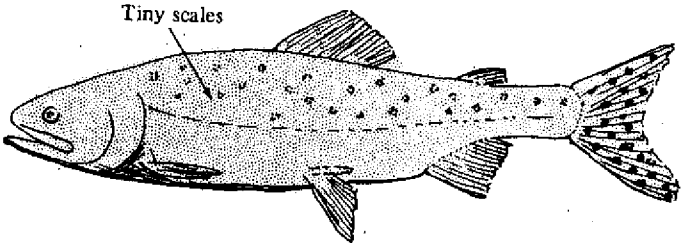
KING or CHINOOK

Average size: 15-40 pounds
Average lifespan: 4-5 years



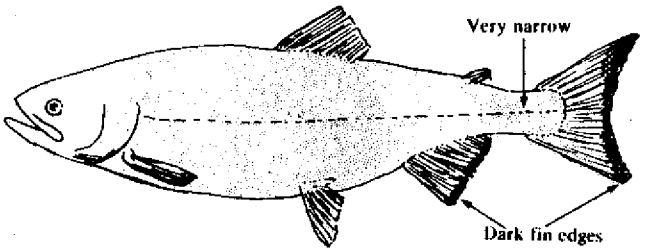
SILVER or COHO

Average size: 6-12 pounds
Average lifespan: 2-4 years



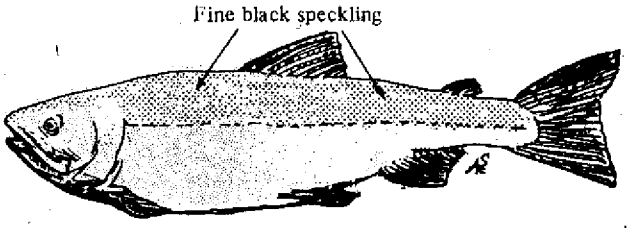
PINK or HUMPBACK

Average size: 3-7 pounds
Average lifespan: 2 years



CHUM or DOG

Average size: 5-20 pounds
Average lifespan: 3-5 years



RED or SOCKEYE

Average size: 4-8 pounds
Average lifespan: 4-5 years

Which species (kinds) of salmon are found in waters near you? How do the species differ from each other? List as many characteristics as you can for each species. (Clues: compare parts of the fish, appearance, location and density of spots or speckling, names, and size data given.) To the aquaculturist or fisherman, which species would bring the earliest return? The most profitable return? Why?

How the Salmon Started Up The Rivers

English adaptation by Henry A. Davis, Kake, from the Tlingit version "The Salmon Box" as told by Robert Zuboff, Angoon

To the Tlingit Indians of Southeast Alaska, salmon was more than just a major food item. It also played an important part in their beliefs, customs, artwork, and legends. Tlingit clans and house groups felt they had special ownership rights to the fish that came to their particular stream. And while they had no way of knowing that the salmon came back to the exact place where they were spawned, they marveled at this regular return. Here is one of their legends about how the salmon runs began:

After the earth's creation, Raven stole water from his best friend on the Hazy Islands. As he flew away with a mouthful of water, his friend gave chase. Wherever Raven dropped a big drop of water, it became a big river or a large lake. The smaller drops became smaller lakes, creeks and streams. But alas, there were no salmon in the inlets, rivers, or creeks.

The salmon and other fishes were kept in a house in the middle of the Pacific Ocean. These salmon were able to spawn right in the ocean, so they never came into the bays and inlets. Only the rich chiefs were able to go out to the ocean in their big canoes to get some of the salmon for food. The poorer people were not able to go out, so they just watched the rich eating the fine salmon.

Raven soon heard of this and he gave a lot of thought to just how he could get the salmon and other fish to the bays and inlets. Then he heard of another being, Xanaxgatwaayaa, who possessed an octopus-tentacle staff with supernatural powers. Raven thought, "With such powers in a staff, I could latch it to the salmon's house and pull it shoreward."

By means of trickery, Raven got Xanaxgatwaayaa to trade his staff for Raven's bow and arrow. With the staff, Raven and his nephew, Crow, made their way towards the Alsek River near Yakutat. At the entrance of the river, he latched his staff to the salmon house. Raven struggled with all his might, pulling and tugging, without success.

Then Crow urged Raven to sing a song about Xanaxgatwaayaa, and when he started to sing he easily pulled all of the salmon into the bays and inlets so they could go up the rivers to spawn. To this day, the tracks of the Raven are at the entrance of Alsek River where he struggled to pull in all the salmon.

(Look at a map of the northern portion of Southeast Alaska and find where the Alsek River empties into Dry Bay. Can you make out Raven's tracks?)

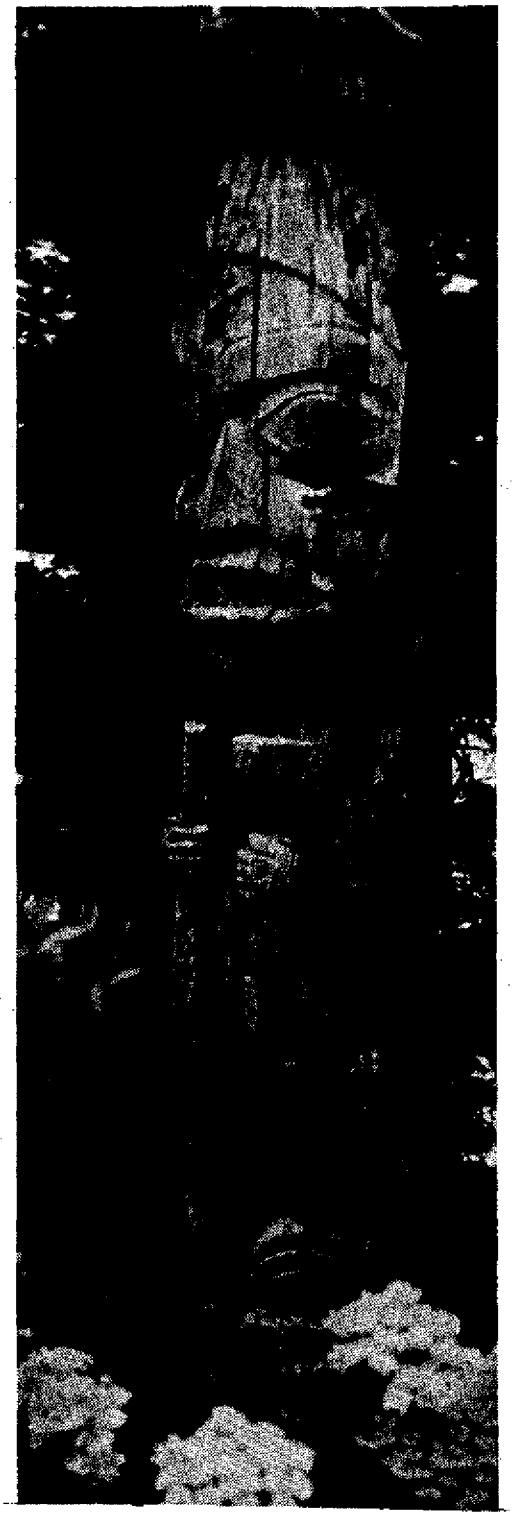
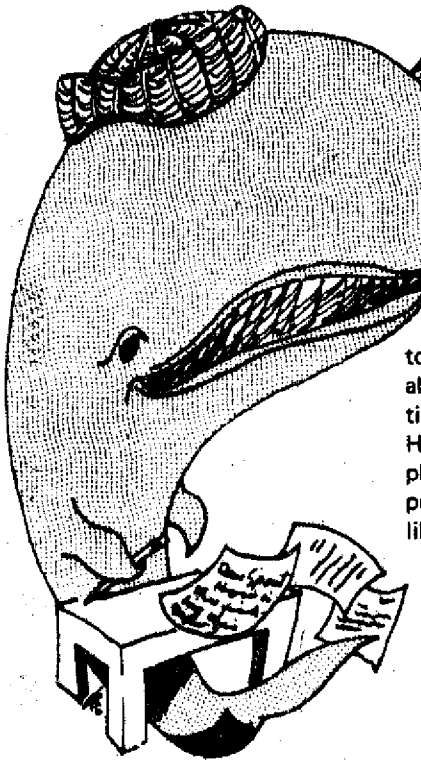


Photo courtesy of the Totem Heritage Center

This is a century-old totem pole of Fog Woman, Raven's first wife. Every time Fog Woman washed her hands in her basket, the story goes, a salmon would appear. The totem came from Village Island south of Ketchikan, and can now be seen at the Totem Heritage Center in Ketchikan.



SPOUT

This column is a place for our readers to spout off. Send Spout your questions about Alaska's water world — fish, seals, tides — and he will try to answer them. He also likes fish stories, fishy jokes, photographs, drawings, cartoons, recipes, puzzles, and opinions. But mostly, he likes mail. Write to him:

c/o *Alaska Tidelines:*
Alaska Sea Grant Program
University of Alaska
Fairbanks, Alaska 99701

Spout's Joke(?)
Joe: What is a mermaid?
Blow: A deep-shee fish.

Dear Spout:

How do salmon find their way back to the stream in which they were born?

Puzzled

Dear Puzzled:

This is certainly a puzzling question! For years scientists have been trying to figure out how a salmon can roam in the ocean for thousands of miles and then come back to the very spot where it hatched out. Is it "navigating" by the sun? The tidal pull of the moon? The stars? The water currents?

But now, many scientists believe that at least the last part of the salmon's homing instinct comes from its sharp sense of smell. Each freshwater stream or lake — or even hatchery outlet — may have its own special scent, due to soil or plant life or something else in the area.

Whatever it is, experiments have shown that when a salmon's sense of smell is blocked, it becomes confused and tends to stray.

Spout

About Salmon & Such

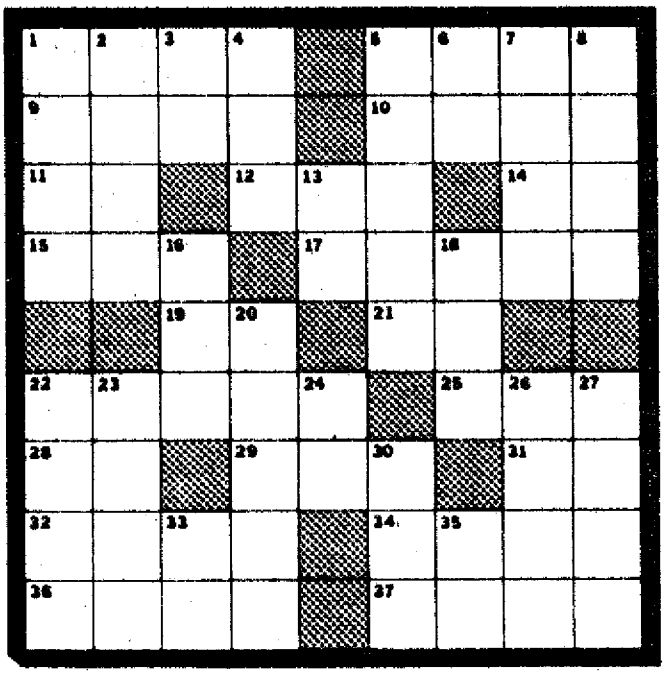
Starred words are based on information in this issue.

ACROSS

*1. Another name for the Silver salmon.
5. When fishing, lifejackets help keep you ____.
*9. One of the salmon's fins.
10. After you have hooked a big salmon, you may have to ____ it for a while before you bring it in.
11. Mountain (abbr.)
12. The proposed Equal Rights Amendment for women (init.).
14. Second note of the musical scale.
15. This is a must for cooking fish stew.
17. A fish ____ in the water.
19. The opposite of yes.
21. New Mexico (abbr.).
22. After you (10 across) that big salmon long enough, you'll probably ____ it.
25. Parent-Teacher Association (init.).
28. Hour (abbr.).
*29. One of the fish the Japanese raise in aquaculture.
31. Sometimes you take these tests at school (init.).
32. University of California at Los Angeles (abbr.).
34. A big glacier in Southeast Alaska.
*36. Some people think the ____ might have an effect on the salmon's homing instinct.
*37. The Sitka salmon returned to the ____ around the mouth of Indian River.

DOWN

*1. When the salmon are running, many people move to the rivers and set up fish ____.
2. On top of.
3. A short laugh.
4. A man's name.
*5. Salmon return to the freshwater lakes and rivers to ____.
6. Alfred's friends call him ____.
*7. On land, you'd call an aquaculture operation a ____.
*8. It is thought that a salmon uses his nose more than his ____ when finding his way home.
13. The letters in the alphabet between Q and T.
16. A powerful kind of explosive (init.).



18. A small mischievous person.
*20. The salmon spends most of its adult life in the ____.
*22. Another name for Dog salmon.
23. One of the oil companies active in Alaska (init.).
24. Masculine pronoun.
26. A little child.
*27. Latin word for water.
30. Blimps and balloons are classified as Lighter Than Air (init.).
33. Behold!
35. Alaska Railroad (init.).

(Answer in October issue.)

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