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# XA'AT ATWU WEI AASKWANI: SALMON IN THE TREES

A Science Literacy Unit for High School: Student Packet

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Photo Credit: 2013 GHF Path to Excellence Academy

**Unit Overview:** The Learning Extensions approach Ecology from two cultural perspectives—Western scientific biological knowledge and traditional Tlingit knowledge of the natural world. The activities are designed to lead students to better understand and appreciate the fragile balance of life which makes up the ecosystem of Southeast Alaska.

The extension activities reflect the Tlingit belief that a sense of place is the foundation of culture and wellbeing. Knowledge about place, and respect for place are both necessary for a person to live a healthy, well balanced life. Based on these cultural beliefs, these materials have been developed by the Goldbelt Heritage Foundation for all students in the Juneau schools to use and enjoy.

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## Standards Addressed in this Unit

Next Generation Science Standards & Alaska Standards for Culturally-Responsive Schools

### NGSS Performance Expectations

#### ***HS-LS2-4. Use mathematical representations to support claims for the cycling of matter and flow of energy among organisms in an ecosystem***

##### *LS2.B. Cycles of Matter and Energy Transfer in Ecosystems*

Plants or algae form the lowest level of the food web. At each link upward in a food web, only a small fraction of the matter consumed at the lower level is transferred upward, to produce growth and release energy in cellular respiration at the higher level. Given this inefficiency, there are generally fewer organisms at higher levels of a food web. Some matter reacts to release energy for life functions, some matter is stored in newly made structures, and much is discarded. The chemical elements that make up the molecules of organisms pass through food webs and into and out of the atmosphere and soil, and they are combined and recombined in different ways. At each link in an ecosystem, matter and energy are conserved. (HS-LS2-4)

#### ***HS-LS2-1. Use mathematical and/or computational representations to support explanations of factors that affect carrying capacity of ecosystems at different scales.***

##### *LS2.A: Interdependent Relationships in Ecosystems*

Ecosystems have carrying capacities, which are limits to the numbers of organisms and populations they can support. These limits result from such factors as the availability of living and nonliving resources and from such challenges such as predation, competition, and disease. Organisms would have the capacity to produce populations of great size were it not for the fact that environments and resources are finite. This fundamental tension affects the abundance (number of individuals) of species in any given ecosystem. (HS-LS2-1),(HS-LS2-2)

### Cultural Standards for Students

A.7. Determine the place of their cultural community in the regional, state, national, and international political and economic systems

B.3. Make appropriate choices regarding the long-term consequences of their actions

D.1. Acquire in-depth cultural knowledge through active participation and meaningful interaction with Elders

E.2. Understand the ecology and geography of the bioregion they inhabit

### Cultural Standards for Educators

A.1. Utilize Elders' expertise in multiple ways in their teaching

A.3. Provide opportunities for students to learn through observation and hands-on demonstration of cultural knowledge and skills

B.1. Regularly engage students in appropriate projects and experiential learning activities in the surround environment

D.3. Seek to continually learn about and build upon the cultural knowledge that students bring with them from their homes and community

Overview of Lessons	Literacy Strategies	Academic Vocabulary	Assessments
<p><b>Lesson 1: Alive in the Eddy</b> Students will read together the Tlingit oral narrative, the Salmon Boy Story and examine the narrative for ecological insights. Using a display map of SE Alaska, students will collectively share their thoughts about the meaning of the story and the ecological uniqueness of SE Alaska.</p>	<ul style="list-style-type: none"> <li>• Close reading</li> <li>• Visualization</li> </ul>	<ul style="list-style-type: none"> <li>• ecology</li> <li>• ecological niche</li> <li>• biosphere</li> </ul>	<ul style="list-style-type: none"> <li>• Journal prompt</li> <li>• Class discussions</li> </ul>
<p><b>Lesson 2: Salmon in the Trees</b> Using Amy Gulick’s book, <u>Salmon in the Trees</u> and the 10 minute video with the same title, students explore the complex relationship that exists between salmon and the rainforest. Students write about the uniqueness of the temperate rainforest and construct a southeast forest food web.</p>	<ul style="list-style-type: none"> <li>• Quick write</li> <li>• Reread</li> <li>• Activating prior knowledge</li> </ul>	<ul style="list-style-type: none"> <li>• biomass</li> <li>• food chain</li> <li>• food web</li> <li>• producer</li> <li>• consumer</li> </ul>	<ul style="list-style-type: none"> <li>• Pre-assessment</li> <li>• Journal prompt</li> <li>• Class discussions</li> </ul>
<p><b>Lesson 3: Five Species of Alaska Salmon</b> To introduce students to concepts of plant systems including plant structure and function, photosynthesis, and reproduction with a concluding ecological survey of a local area.</p>	<ul style="list-style-type: none"> <li>• Quick write</li> <li>• Graphic organizer</li> <li>• Activating prior knowledge</li> <li>• Chunking the activity</li> </ul>	<ul style="list-style-type: none"> <li>• dorsal fin</li> <li>• adipose fin</li> <li>• caudal fin</li> <li>• pectoral fin</li> <li>• operculum</li> </ul>	<ul style="list-style-type: none"> <li>• Journal prompt</li> <li>• Salmon ID notes</li> <li>• Class discussions</li> <li>• Group presentations</li> </ul>
<p><b>Lesson 4: Salmon Project</b> Students will learn to identify the five species of Pacific salmon and the potentially invasive Atlantic salmon. Students will learn about the unique characteristics of the various Pacific salmon species and investigate environmental, commercial, and social issues which affect the health and sustainability of salmon runs in Southeast and throughout Alaska.</p>	<ul style="list-style-type: none"> <li>• Peer reflections</li> <li>• Close reading</li> <li>• Generating questions</li> <li>• Summarizing</li> </ul>	<ul style="list-style-type: none"> <li>• respect</li> <li>• woocheen</li> </ul>	<ul style="list-style-type: none"> <li>• Post-assessment prompt</li> <li>• Final presentation</li> </ul>

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## ALIVE IN THE EDDY: AS TOLD BY A.P. JOHNSON

The story I am going to tell you belonged to the Kiks.ádi clan. The event took place near Sitka at the Nakwasena River.

Toward fall time we go to Nakwasena and we dry salmon. At first we dry the humpies. But we don't dry very many humpies. It doesn't keep very well for the winter. We only dry a few of them—maybe 25 or 50 of them per family. We eat it right away. We don't keep it for the coming winter.

Then comes the fresh run of the dog salmon, right from the ocean. We do not dry very many of them; we only dry a few. The eggs from the female dog salmon are still in one piece and the **milt** from the male is still hard and all in one piece when they first come in.

Now that dried salmon, that dried dog salmon is only kept for soaking. They are fresh run salmon from the ocean. When it's dried, it dries like a piece of wood. You couldn't even bite it. You couldn't take a bite off of it, even if you broiled it. They use it for soaking. They soak it down at the beach, maybe for 12 hours. By that time it's soaked enough and they boil it for breakfast. With seal oil it tastes good, especially to those who have grown up eating such food. They enjoy it very much; I know I do.

When the dorsal fin on the dog salmon begins to show white spots on top, on the end, they would take these dog salmon. The male dog salmon milt would be so soft it would start running. When it breaks open it almost runs out of it. And the female dog salmon eggs are very loose. If you just squeeze the stomach, eggs begin to fall out. Now quite a lot of these are dried for the coming winter. And when you broil it over the fire the flesh is crumbly, nice and soft. Even the old people enjoy it, even though they haven't got very strong teeth. It's very delicious. It doesn't contain very much oil. It's mostly fish flesh and not much oil.

And this is what they were doing in Nakwasena. People were there to put up food. They were already putting up the winter supply of dog salmon, drying it up thoroughly. And the boys were having lots of fun on the beach.

We are taught to capture birds and animals alive. But we do not keep them as pets. The moment we catch them we let them go. Sometimes we use snares. Aak'wtaatseen, a young boy of 12 or 14, was playing with a snare his father made him near the shore of the river.

Now, a lot of loose salmon eggs are put in the bottom of the river under the snare. And the seagulls have a habit of dipping down. As they dip down to eat the salmon eggs they'll put their head through the snare. When they come back up it's around their neck.

We'd have lots of fun. We'd go down there. Our mothers would put dry clothes on us. In less than 5 minutes we are soaking wet from head to feet. Even the shoes are all soaking wet.

And that's what Aak'wtaatseen was doing, and they were having lots of fun, counting how many seagulls they had caught. In the midst of all that, Aak'wtaatseen had gone home to eat his noon

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lunch. He was very hungry. He knew what to do. He ran on up to the house where his mother was preparing the winter supply of food.

He asked his mother, “Mother, may I have a piece of dried fish?” His mother gave him a piece. “Here, you eat that.” It’s somewhat rich; the part of the salmon she gave him is somewhat rich.

He looked at it. “Ahh, the salmon is a little moldy.” He complained. “It’s a little moldy.”

His mother told him, “A little mold won’t hurt you. Go ahead and eat it.”

Just then someone called out from the beach. “Aak’wtaatseen! You have a seagull in your snare!”

He forgot about the piece of dried salmon and started to run. When he went out in the water, the seagull began to pull the whole thing out. It came loose from the rocks and kept on going and pretty soon the water was up above his waistline. He disappeared.

The father ran down, got in the water. The water was clear. There was no sign of Aak’wtaatseen. There were just dog salmon swimming around. No one knew what happened to Aak’wtaatseen.

According to the story, the people of the salmon captured him. The salmon people took him way out to the ocean, way out on the sea; took him to the place where the young salmon go in the fall of the year after they leave the salmon river. He stayed out there for about three or four years among the salmon people.

There was a time he was so very lonesome, he could not even bear it. He felt like weeping. But he decided he wasn’t going to weep. He rebelled. He didn’t want to eat anything. They tried to give him food but he wouldn’t take it. They took him to the mouth of a large river. On each side of the river, just as it enters the ocean, there was a creature in the water. One on his side, another one on his other side.

They were the happiest creatures. All day long they danced. They’d go up and down in the water and come up again, and then would go down again. Aak’wtaatseen hadn’t laughed now for many days. They took him to one side of the river and put his arms around one of the creatures. They told him, “Now, you hang on tight, don’t be afraid of getting drowned.” As he put his arms around the creature, the creature began to dance with him. It amused him so much he started laughing. And they put his arms around the other one. After that he was himself again.

Now one day they told him, “We’re going to go to a big diner that’s going on. It’s put on by different people. The people are people whom you know. You are well acquainted with them, but you have never thought of them as people. You thought of them as creatures of the sea.”

As he came near the place with the salmon people, he heard people singing Indian songs that were very happy, and beating a drum. You could see feathers flying all over. The feather, the symbol of peace. He wanted to see who they were. He looked through a crack, and as he looked through the crack he felt something on his face. It seemed to be covering that part of his face

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where he thought the feathers were flying around. When he reached up and scratched it he found on him herring eggs. Those were herring people putting on a big dance.

After Aak'wtaatseen left he went back and one day they told him, "We are going back to your country, to the place that you came from." They kept on going. Everybody was paddling. He wasn't paddling; he was sitting right in the middle of the canoe, and each time they would tell him where they were.

According to the Tlingit people, way out in the ocean, in the middle of the ocean in the deep places, there is no light. It's all dark. And when they came to the line where it gets dark, Aak'wtaatseen saw very fearful things ahead of him. There were large eyes looking at him. And each time before an individual went past the line he would let out a war cry and he'd rush right by those places in a hurry. As they went by, some of them were bitten. And when the salmon come to the river you find teeth marks on some of them. You never knew what bit them, what kind of creature bit them.

At this time we already had copper; we were using copper for implements and ornaments. There were those who worked in metal who would make copper wires. They made it into the form of a rope. Very flexible. More like chains all linked together. They would measure a full-grown man's neck, and when the child got to be a certain age, when the head was the size of a grown man's neck, they would slip this endless copper rope over his head. And the child commenced to grow, and they wouldn't take this off; he died with it on. And this showed the person was from an aristocratic family and they put this around the neck of Aak'wtaatseen when he was a baby, being of an aristocratic family.

And when he came nearer the river, the father and the mother saw a very nice looking, stream-lined dog salmon. It was so pretty, a very large dog salmon, unusually larger than the rest, with no marks on it. It was a perfect fish.

Aak'wtaatseen recognized his family before he went on up the river. As they came to where the river people were going, some of his friends, some relatives, were going in a canoe. The fish people told Aak'wtaatseen, "There is your clan going up there. They know who you are. Stand up and look at them." Aak'wtaatseen in his mind stood up. He thought he stood up. Instead of that, the people in the canoe called out, "Here jump!"

Finally the father hooked him, brought him ashore and the mother started to cut the head, and they found under the skin was this copper rope. She recognized him.

Then all the women cleared out and cleansed the whole smoke house. They put him on the platform right above the door. They had no fire in it. They put the body of the fish there and they put a very nice skin blanket over it. For several days it was there.

And finally, they heard the blue fly's sound up there. And it began to change into a tune. The platform was very large. Big enough to hold a human being. As time went on they knew it wasn't a

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blue fly, but a person singing. And they went up there on a ladder and took his body down. He returned back with his own people.

And it was told that he became one of the strongest ixt' of the Kiks.ádi people. He practiced telepathy and portation. He could communicate with Kake from here. That was the first wireless station in Alaska.

When they brought him down he became one of the strongest ixt' among the Kiks.ádis. And later on he composed a song. It did not become the national song but we sing it quite often. You don't dance to this song, like you would any other. You have mountain sheep wool dyed red. The women wear them hanging from their ears. The first verse you swing towards your left. The second verse you swing to the right. And the men keep time with the long sticks with the emblems on them.

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**SOUTHEAST ALASKA:  
ONE OF THE MOST UNIQUE PLACES ON EARTH**

<b>Evidence</b>	<b>Facts</b>	<b>Observations</b>	<b>Activities</b>



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NAME: \_\_\_\_\_

DATE: \_\_\_\_\_

**SALMON IN THE TREES: PRE-ASSESSMENT (LESSON #1)**

1. Write a paragraph which describes three to five important facts about salmon in Southeast Alaska.

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2. Describe the relationship between salmon and the forests of Southeast Alaska?

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## IDENTIFYING THE FOOD WEB

**Primary  
Producers**

**Herbivores**

**Carnivores**

**Omnivores**

**Scavengers**

**Decomposers**


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## VOCABULARY

Write the scientific definition for each of these words.

**biosphere**

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**biomass**

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**consumer**

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**producer**

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**ecology**

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**food chain**

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**food web**

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**ecological niche**

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**food sovereignty**

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**ecological footprint**

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**dorsal fin**

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**andipose fin**

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**caudal fin**

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**operculum**

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## SALMON IDENTIFICATION NOTESHEET

Directions: Use this sheet to take notes from the Salmon Identification presentations. Write down the significant identification characteristics of each salmon species.

### King (Chinook)

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### Coho (Silver)

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### Pink (Humpback)

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**Sockeye (Red)**

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**Chum (Dog)**

Name: \_\_\_\_\_

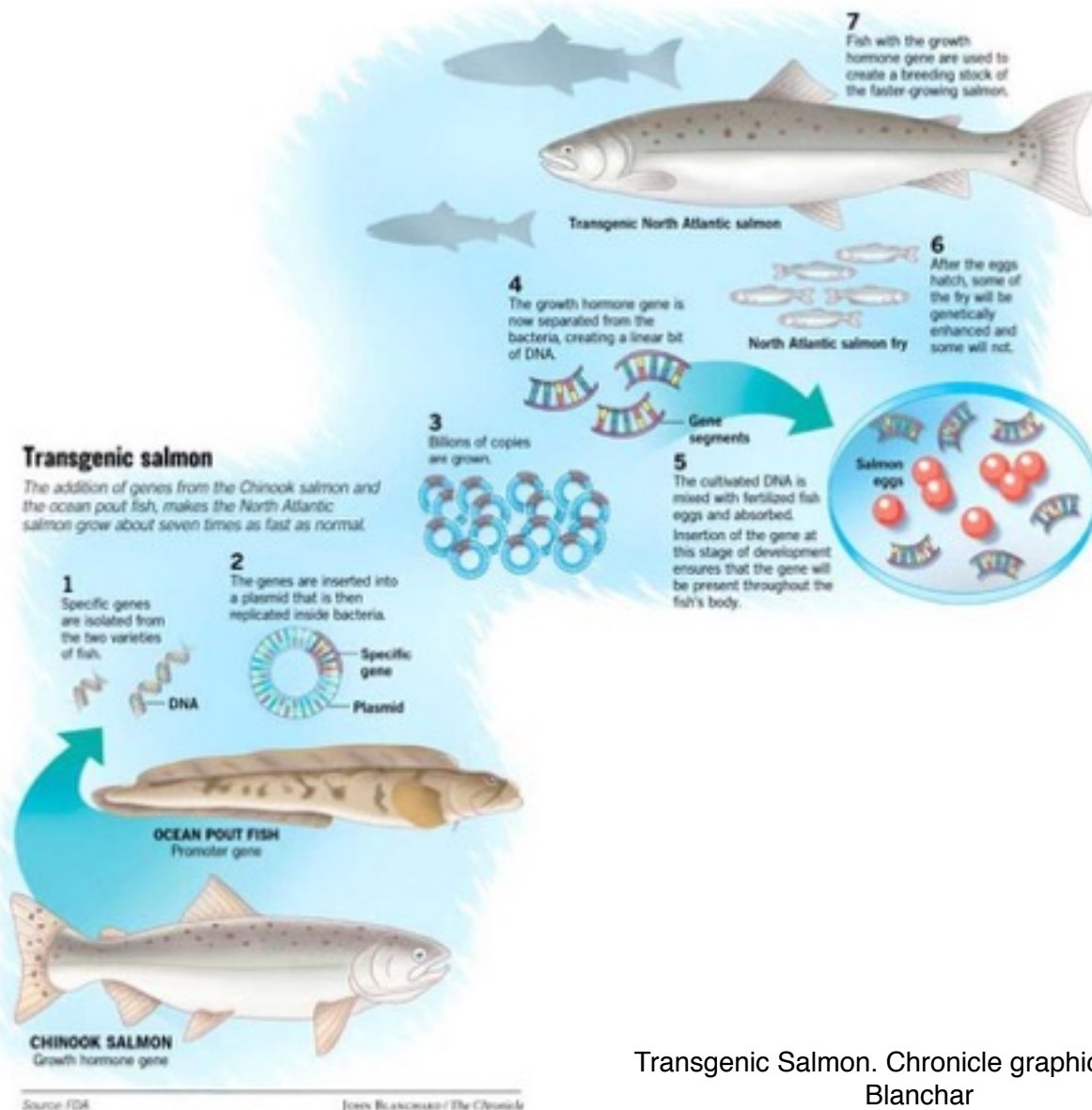
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## FREE RESPONSE

Read the following article, and respond with a defensive statement supporting or opposing the introduction of genetically engineered fish into local Alaskan waters. Article originally found: <http://www.sfgate.com/news/article/Frankenfish-spawn-controversy-Debate-over-2843540.php>

*'Frankenfish' spawn controversy: Debate over genetically altered salmon*

Jane Kay, Chronicle Environment Writer Published 4:00 am, Monday, April 29, 2002



Transgenic Salmon. Chronicle graphic by John Blanchard

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It looks like a North Atlantic salmon. But it grows seven times faster, and it's much more attractive to the opposite sex than a normal salmon.

It's a transgenic fish, the first genetically engineered animal under review for the U.S. food supply. Embedded in every cell of its body are genes from the Chinook salmon and the ocean pout fish that make it grow more quickly.

The altered salmon is likely to become the next focus in the battle over bioengineered food, after controversies over the desirability of genetically altered bovine growth hormones in cows and modified corn, soybeans and canola in cereals and tortilla chips.

In the next year, the U.S. Food and Drug Administration will consider a petition by Aqua Bounty Farms of Waltham, Mass., to farm and market the altered salmon.

Already, the prospect of mutant fish escaping and disrupting already threatened wild populations has prompted lawmakers in several states to take pre-emptive steps. California could become the first state to ban transgenic fish outright.

Last week, the Senate Natural Resources Committee approved a bill by Sen. Byron Sher, D-Palo Alto, that would make it illegal to import, transport, possess or release transgenic fish. They would be considered an "aquatic nuisance," a category that includes piranhas, slugs and giant toads that threaten wildlife.

Another bill by Assemblywoman Virginia Strom-Martin, D-Duncan Mills, would require labeling of transgenic fish sold in markets. And a joint legislative resolution introduced by Assemblyman Joe Nation, D-San Rafael, urges the FDA to deny Aqua Bounty's petition and put in place a moratorium on transgenic fish.

#### 'FRANKENFISH' CONDEMNED

The bills -- and Sher's in particular -- have strong support from consumer, environmental and commercial fishing groups, which dub the altered salmon a "Frankenfish" that would eat or outcompete smaller wild species and cause their extinction. What's more, critics say, federal regulatory oversight of bio-engineered foods is not sufficient to guarantee the fish are safe to eat.

Proponents of biotechnology, on the other hand, view transgenic fish as the answer to supplying consumers with healthful fish without depleting the ocean's declining populations. To fish farmers, it means being able to grow salmon in half the time and at lower feed costs. Sher's bill could abruptly end these hopes. Biotechnology trade groups, the National Food Processors Association, the state Chamber of Commerce, California Farm Bureau and the California Grocers Association oppose the legislation.

Passing a strict anti-transgenic fish state law would create "a precedent, and could poison the well. Once the door is shut, we may never be able to find the key to open it up again," said George Gough, a Sacramento lobbyist for Monsanto Co.

He urges legislators to leave it up to the FDA, which must consult with federal wildlife and fisheries agencies, to decide whether the bio-engineered salmon is safe.



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"This is really the first biotech animal that is going through the review process. The FDA is going to be taking a microscope to this, and it should. When you you say 'fish' or 'beef,' it hits you more than when you say 'soybean, ' " he said.

While Monsanto doesn't work with fish, it's one of the largest producers of transgenic crops, holding dozens of patents on new biotech products, among them soybeans, potatoes, canola and corn. The company believes a California ban would have a chilling effect on the industry and investors.

Opponents of biotechnology say a pre-emptive strike is crucial. About two dozen varieties of genetically engineered fish or shellfish are under development, most aimed at increasing growth and resistance to disease in such species as abalone, oysters, striped bass, rainbow trout, catfish and tilapia.

#### THREAT TO NATURAL RESOURCES

"These genetically engineered fish will pose a threat to our natural resources," said Natasha Benjamin, program officer with the Institute for Fisheries Resources, a research arm of the Pacific Coast Federation of Fishermen's Associations.

"California is known to set a precedent when it comes to environmental standards. We hope to see the state take the lead in this issue, and hopefully other states will follow," she said.

At the crux of the debate is whether the superfish would escape into the wild and harm native salmon populations. Damaged by dams, pollution, invasive species and loss of fresh water, salmon are already struggling for sustainability on the Pacific Coast.

A 1999 study by Purdue University scientists predicted ecological risks from the release of transgenic fish into the wild.

The researchers found the larger transgenic fish were more attractive mates for native fish, thus allowing a trait to spread quickly through the wild population. But because the offspring don't live long, eventually the native population would be wiped out.

The study caused widespread concern because in aquaculture, the escape of farmed fish is inevitable.

#### TRANSGENIC FISH LAWS

Last year, Maryland passed a law prohibiting transgenic fish any place that might connect with waterways. In Oregon, the law prohibits the release of transgenic fish into locations where they can mingle with wild populations. There are discussions in Alaska over an outright ban.

Representatives of Aqua Bounty Farms say its modified Atlantic salmon won't threaten wild stocks. The company will use only sterile females in netted pens, so, if they escape, they won't spawn and pass along the genetic traits.

Joseph McGonigle, vice president of Aqua Bounty, said the technique that his company uses to sterilize eggs "is 100 percent effective. We will be doing . . . screening on every batch of eggs that is done."

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But fish scientists, including some from the aquaculture industry, say there is still a chance that a small percentage of fish will be fertile. And they predict another problem: Wild male salmon will try to mate with the larger but sterile female salmon, depressing reproduction rates.

Aquaculture is the fastest growing segment of agriculture, according to the U.S. Department of Agriculture. In California, sales of farmed fish and shellfish have jumped from \$33 million a year in 1991 to \$71 million in 1999 from more than 100 producers.

"The majority of our producers are not involved in transgenics. What we're grappling with is that there may be some transgenic techniques that are proven safe that would be excluded by this bill," said Justin Malan, executive director of the California Aquaculture Association.

The trade group is negotiating with the bill's author to change the language. One of the aquaculture industry's problems is that the bill shuts out all commercial ventures.

"It's a question of whether the importation of transgenic fish should be banned or adequately regulated," Malan said. "We don't have a problem with stipulations that will safeguard the environment or public health, but a ban is forever."