

Chugach Regional Resources Commission K-12 Science Curriculum Project



# Unit 1: Oceans & Rivers

Many ecological, social, and cultural relationships exist and are interdependent.

# Lesson Plan 2 – "The Gulf of Alaska Today and Tomorrow"

Summary: The Gulf of Alaska is an important source of food to the people of the Chugach region and the students will learn the interconnected ties that marine life has within the food chain and food web. Students will also learn about the life and characteristics of Pacific Herring and its part in the marine food chain. Students will also

examine how herring, herring roe, and kelp are a part of the Alutiia and culture how herring is fished now and in the past.



Illustration from Eyak Legends © Chugach Alaska Corporation. All rights reserved.

# Grade Level:

K-4, 5-8, 9-12

#### Time required:

Three to five class periods of 45 minutes

#### Materials needed:

- Poster board or butcher paper •
- Markers, colored pencils, or other art materials
- Science Journals
- Herring and herring roe, or pictures of them

• Maps of Pacific herring migration routes

#### Learning objectives:

- Students will identify and name marine fish and mammal species of the Gulf of Alaska.
- Students will organize a simple food chain and a food web of familiar plants and marine fish or mammals from the Gulf of Alaska.
- Students will describe how energy for life primarily derives from the sun.
- Students will understand the groups of marine species such as fish, pinniped, and cetaceans, including the features of individual species (Pacific Herring) utilized by the Chugach tribes.
- Students will understand that lack of resources and factors such as predation and climate limit the growth of populations in specific niches in the ecosystem.

### Vocabulary introduced:

Plankton, pelagic organisms, benthic, demersal, producers, consumers, herbivores, carnivores, omnivores, decomposers

### National Science Education Standards:

### Life Science

Content Standard C: As a result of their activities in grades K-4, all students should develop an understanding of the following:

- Characteristics of organisms
- Life cycles of organisms
- Organisms and environments

Content Standard C: As a result of their activities in grades 5-8, all students should develop an understanding of the following:

- Structure and function in living systems
- Reproduction and heredity
- Regulation and behavior
- Populations and ecosystems
- Diversity and adaptations of organisms

Content Standard C: As a result of tier activities in grades 9-12, all students should develop an understanding of the following:

- The cell
- Molecular basis of heredity
- Biological evolution
- Interdependence of organisms
- Matter, energy, and organization in living systems
- Behavior of organisms

# Alaska State Standards:

#### Concepts of Life Science

A student should understand and be able to apply the concepts, models, theories, facts, evidence, systems, and processes of life science.

A student who meets the content standard should be able to develop the following:

- An understanding of how science explains changes in life forms over time, including genetics, heredity, the process of natural selection, and biological evolution;
- An understanding of the structure function, behavior, development, life cycles, and diversity of living organisms; and
- An understanding that all organisms are linked to each other and their physical environments through the transfer and transformation of matter and energy.

#### **Background Information:**

Take notice of the natural environment surrounding the school area and know where indigenous food comes from for the community. Also know the names of the marine life by both the western and Indigenous names (see vocabulary).

Find out if there are local beliefs regarding the fish, mammals, and seaweed that exist to share with the students.

Meet the elders/cultural bearers prior to their visit to the classroom so they understand what you would like them to share and let them become familiar with the classroom. You can also visit the beach with the elder. Contact the Tribe (see Community Contacts).

Have water or tea for the elder/cultural bearer to drink during their visit to the classroom.

Review social expectations with the class prior to the guest speaker (sitting respectfully listening to stories, waiting until the speaker has finished talking before asking questions, offering assistance/escorting when the speaker is leaving).

Have a small gift of thanks for the guest (something made by the class, or a card, and follow with a letter from the students).

#### Elders' Observations

"The ocean is part of me. Sometimes, I just have to go down there to smell the ocean." (Simeon Kvasnikoff, Elder, Port Graham)

"Of all the things we have lost since non-natives came to our land, we have never lost our connection with the water. The water is our source of life. So long as the water is alive, Chugach Natives are alive." (Walter Meganack Sr., Past Chief, Port Graham)

"Wow, this place would stink. It was like a mountain. Piles and piles of carcasses. Every summer it would happen. Salmon, herring, head, tails, bones. Everything went on the beach." (Dorothy Norman, Elder, Port Graham)

(From Imam Cimiuca by Salomon & Huntington, 2010)

About herring spawn:

<u>Chemavisky</u>: ...old log, then you cut the logs and split 'em. Then you put buoy on 'em...sink 'em. <u>Kuntz</u>: Oh, it's for getting the herring spawns, uh? <u>Chemavisky</u>: Then that thing there will be 'bout that thick, both sides...herring spawns. <u>Kuntz</u>: They like to spawn on logs, or anything?
<u>Chemavisky</u>: Anything.
<u>Johnson</u>: Yeah, I heard guys that used to put branches...
<u>Chemavisky</u>: Yeah, anything...
<u>Johnson</u>: ...in the water.
<u>Chemavisky</u>: ...just scrape it off. Get bucket, and just...in a couple tides, big bucket be full. Then they dry that up.
<u>Kuntz</u>: Alright. They put in seal oil? Or what?
<u>Chemavisky</u>: No, just dry 'em up. Then when...before they used it, then they cook 'em, see? Then mix 'em up with seal oil.
<u>Johnson</u>: I've tried 'em before...I tried some just fresh ones, boiled. They really pop

(Chemavisky Theodore F, 1980, Side A, Tape Counter Numbers 325-339, BIA)



Audio: Fireweek Cillqaq, Vol 3: Interview with Tim Malchoff about Herring Fishing (1983). Copyright Kenai Peninsula Borough School District. Visit <u>http://www.ankn.uaf.edu/ancr/Alutiig/Fireweed/Issue3/index.htm</u>



Interview with Seward/Qutekcak Elders about fishing, herring and subsistence.

# **Resources: Alutiiq Words**

Sealije Relatea Terms	
Fish	iqalluk
Herring (Pacific)	iqalluarpak
Roe	qaryaq
Kelp	qahnguq
Whale (in general)	arwaq
Salmon	iqalluk
Dog salmon/Chum (Oncorhynchus keta)	alimaq
King salmon /Chinook (O. tsawytscha)	lluq'akaaq
Pink salmon/Humpy (O. gorbuscha)	amartuq
Red salmon/Sockeye (O. nerka)	niklliq
Silver salmon/Coho (O. kisutch)	qakiiyaq
Seal	qaigyaq
(Fur seal	aataak)
Killer whale	arlluk
Ocean/sea	imaq
Octopus	amikuq
Sea otter	ikam'aq
Porpoise	mangaq
Spawned salmon	uganukiiguk
Smoked salmon	palek
Canned salmon	kaansaamaq
Seal pup	qaigya'aq

wiinaq
naruyaq
asweq
ciilbiq
iqallugpik
qulunanguaq
seg'aq
tamuuq
kepuraq, qulunguaq
qaryat
rriqtat
patuqulluk
sagiq

(From Nanwalegmiut Paluwigmiut-Ilu Nupugnerit – Conversational Alutiiq Dictionary, Kenai Peninsula Alutiiq by Jeff Leer, 1978)

Months	
January	Cuqllirpaaq Tanqik
	("the first month")
February	Nanilnguq Tanqik
	("the short month")
March	Iciwallaq Tanqiat
	("the spring month")
April	Saqulet Tanqiat
	("the month the ducks and birds lay their eggs")
Мау	Niklliit Tanqiat
	(the month of the red salmon, where the reds start running)
June	Alimat Tanqiat
	(the month the dog/chum salmon start running)
July	Amartut Tanqiat
	(the month the humpies start running)
August	Kiaglag Tanqiik
	(the summer month)
September	Qakkiiyat Tanqia
	(the month silvers start running)
October	Cuqllirrpak Uksuallaq
	(the first winter month)
November	Kinguqullia Uksuallaq
	(the next winter month)
December	Alasistuam Tanqia
	(the Christmas Holiday month)

(Months from "Port Graham – Documenting Traditional Management Practices and Traditional Ecological Knowledge", by Karen Moonin, 2007)

#### Resources: Literature, audio, video, other curriculum

### Literature

- Bailey, Jaquie. Staying Alive: the Story of a Food Chain. 2006.
- Brown, Seitz et al. Ecology of Herring and Other Forage Fish as Recorded by Resource Users of Prince William Sound and Lower Cook Inlet. 2002.
   www.adfg.alaska.gov/static/home/library/PDFs/afrb/browv9n2.pdf
- Capeci & Speirs. Food Chain Frenzy. 2004.
- Chugachmiut. Looking Back on Subsistence; Lower Kenai Peninsula Fishing, p. 5 11. 2000. (scanned copy of pages 1-27 on CRRC files, Chugachmiut has more paper copies in Seward)
- Cole, Joanna & Degen, Bruce. The Magic School Bus, Science Chapter Book #17: Food Chain Frenzy. 2004.
- Hickman & Collins. Hungry Animals: My First Look at a Food Chain. 1997.
- Kachemak Bay Research Reserve/ADF&G Sport Fish Division. *High Sea Drifters A Guide to Marine Plankton*. 2008.
- Lindeberg, Mandy R. & Lindstrom, Sandra C. Field Guide to the Seaweeds of Alaska. 2010.
- Moonin, Karen. Port Graham Documenting Traditional Management Practices and Traditional Ecological Knowledge.2007.
- Mundy, Philip R, ed. *The Gulf of Alaska: biology and oceanography*. Alaska Sea Grant College Program, University of Alaska Fairbanks 2005. (Electric copies sent to schools)

# Videos

- Changing Tides in Tatitlek
   <u>http://www.talkingcircletv.com/flash/videos/LoadMovieChangingTides.html</u> or <u>www.iqsak.com</u>
- Teacher's Domain: Safeguarding Alaska's Waters (Prince William Sound, EVOS, Food web, populations) <u>http://www.teachersdomain.org/resource/ean08.sci.ess.watcyc.contaminants/</u>
- Food chain video: <u>https://www.youtube.com/watch?v=CZhE2p46vJk</u>
- Food chain video: <u>https://www.nationalgeographic.org/encyclopedia/food-chain/</u> <u>https://news.nationalgeographic.com/news/2007/02/070217-acid-oceans.html</u>
- Life in the ocean video: <u>http://www.neok12.com/php/watch.php?v=zX746a747e5d796a6c651a5d&t=Ecosystems</u>

# Other curriculum

- Food Chain Checkers <u>http://www.windows2universe.org/teacher\_resources/checkers\_20march.pdf</u>
- Chugach Curriculum Framework, Importance of Fish, Level 3, Grades 4-6, Subsistence, Lesson 10, Traditional Fishing, p. 189

# SmartBoard

 Food Chains. Students (7-9) will understand 1. all living things can be categorized as primary producers, herbivores, omnivores or carnivores 2. energy from the sun is the basis for all life on earth 3. the number of organisms decrease at each level of a food chain. <u>http://exchange.smarttech.com/details.html?id=566a93a3-14b3-4e9a-baff-2334562a8d05</u>  Echinoderm Food Web. Students (9-12) will watch opening video, review food chains, and then construct a food web for kelp forests. Afterwards, teacher will make sea otters go "extinct" in the web and students must explain the consequences. http://exchange.smarttech.com/details.html?id=e570401b-bba8-42a5-b890-1184325b5b2d

#### Procedure:

#### Engagement

- Have students fill out a poster KWL chart on the Gulf of Alaska sea life (fish, seaweed, mammals, birds). Refer back to this chart adding new information at the end of each lesson.
- Take students on a field trip to observe a coastal area, if not by the coast show a video clip of the coast, then brainstorm a list of the creatures that live within the Gulf closest to the school.
- Ask students to name the foods their families have gathered from the Gulf of Alaska and create a list on butcher paper.
- Ask students to discuss what animals in the region eat herring. What do the herring eat?
- Have students locate local areas where herring and herring roe can be found or used to be found. When is a good time to find roe or fish for herring?

#### Exploration

- Invite Elders/Cultural Knowledge Bearers into the classroom to share their experience and observations of when they gathered marine life as a food source and the connections they know about. Ask questions:
  - o What was once an abundant food item and is now scarce?
  - What changed in the Gulf to make this food source scarce?
  - What is being done to grow this food source today?
- Students create their own food chains and food webs based on what they know about marine life in the Chugach region. Try to include as many links as possible beginning with the sun, plants, herbivores, carnivores and decomposers. (Include fish, plants, and mammals from the region.)
- Students share the food chains and food webs with their peers. Students get feedback from them and discuss the order.

#### Explanation

- Display posters and discuss the connections.
- Write a three-paragraph essay on your food chain.
- Watch the videos.
- Conduct Internet research for more information.

#### Elaboration

- Create PowerPoint<sup>©</sup> presentations on the food webs.
- Discuss what could happen if humans were to impact one of the links in the food chain and food web in a negative way; demonstrate how this impact would change the connections.
- Research a favorite local food from the Gulf of Alaska that has been declining in numbers and find out what happened to upset the chain.
- Students could bring in food that they have prepared and share with the class how that item fits into the food chain they have created.

• Invite a researcher/scientist from a local science center (like Prince William Sound Science Center) to come discuss herring research in the region. Take a field trip to a local science center and familiarize the students with scientific herring research (labs, etc)

#### Evaluation

- Student participation as observed by the teacher.
- Student journal.
- Student posters showing a complete food chain.
- Completed three-paragraph essay.
- Student use of lesson vocabulary words

#### Follow Up Activities:

- Write a thank you letter to the Elder/Cultural Knowledge Bearers.
- Create a video/DVD of your food chain and publish on the Internet.
- Create a game about the food chain or food web that class could play. (Or play the Food chain Checkers.)
- Play a food web ball game with the children; everyone has a role in the web. Start by throwing the ball from the sun (teacher) to photo-plankton (students), to krill, to a whale, to a man, to a bear, to a parasite...and back to the sea.
- Fill out the seasonal species harvest table with community elders and the students. Find out the local, common and scientific names of the species.
- Write a poem, song or story about the life of herring.
- Discuss the natural and human-induced hazards that affect the herring populations in the region and along the migration route (e.g. oil spills)
- Contact the Prince William Sound Science center and discuss/chat/skype with their researchers about local herring populations.
- Cook and taste traditional local foods made of herring, herring roe and kelp.
- Visit the Alaska Sealife Center or other science center in the region and meet with a marine scientist. Discuss their work with them and career possibilities in marine sciences.

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