

FOOD FROM THE SEA: VILLAGES & RESOURCES GR: 6-8 (LESSON 1)

Elder Quotation:

“When resources became limited, people moved on. They took all of their camp out. Then they would go back when resources returned. Villages didn’t exist, there were seasonal camps. They always traveled from fall to spring. That’s what is happening here, we’re not moving.”

– Nick Tanape Sr., Elder, Nanwalek, 2004¹

Grade Level: 6-8

Overview: Traditionally the Sugpiat and Eyak people migrated from their villages to fish and hunting camps to harvest seasonal resources. More permanent villages were established with the advent of Russian trading posts and commercial canneries. Permanent villages changed the pattern and intensity of local resource use and availability.

Standards:

<i>AK Cultural:</i>	<i>AK Content:</i>	<i>CRCC:</i>
D1: Acquire in-depth cultural knowledge through active participation and meaningful interaction with Elders.	Science C (2): A student should understand and be able to apply the concepts, models, theories, facts, evidence, systems, and processes of life science and should (2) develop an understanding of the structure, function, behavior, development, life cycles, and diversity of living organisms.	L1: Students should understand the value and importance of the Sugt’stun language and be actively involved in its preservation.

Lesson Goal: To understand how sustained village location affects the use and availability of local marine resources.

Lesson Objectives: Students will:

- Predict which factors contributed to changes in subsistence food harvests over time.
- Research and appraise leading factors contributing to changes in subsistence harvests.
- Revise timelines to reflect research results.
- Learn to pronounce the Sugt’stun and/or Eyak vocabulary

Vocabulary Words:

Sugt’stun Dialects

English:	PWS:	Lower Cook Inlet:	Eyak:
village	<i>nunagpet</i>	<i>nunagpet</i>	<i>iiyaaGdaad</i> (Literally: at Eyak)
change	<i>cimirluni</i> (pl: <i>cimirluq</i>)	<i>cimirlutku</i> (pl: <i>cimirluq</i>)	
cannery	<i>pankahwik</i>	<i>saalawik</i> (pl: <i>saalawit</i>)	yahdda’aaw

Materials/Resources Needed:

- Map of Alaska showing locations of Port Graham, Nanwalek, and Seldovia
- ‘The Bidarki Story’ Handout / FFS 68 Villages and Resources.1.1 (See below)

Kit Library:

- Salomon, Anne K., et al. *Imam Cimiucia = Our Changing Sea*
- Smelcer, John E. and Morgen A. Young. *We Are the Land We Are the Sea: Stories of Subsistence from the People of Chenega*
- Stamp, Bobby A. *Chenega as I Saw It – It’s People*
- Tabios, Derenty, et al. *Looking Back on Subsistence: Interviews with Elders of the Chugach Region*

Web Resources:

<http://aswc.seagrant.uaf.edu/grade-5/investigation-1/bidarki-story-background.html> Retrieved 1.31.2018 – Teacher Background suitable as research resource

Teacher Preparation:

- Review Activities and practice Sugt’stun and/or Eyak vocabulary.
- Review Alaska Sea Grant Synopsis of Bidarki Population Decline and make student copies.
- Invite Elder to discuss changes in subsistence harvest patterns in the last century.
- Before the Elder or Recognized Expert arrives, please review with all of the students, ways to show respect for the Elder during his or her visit.

Opening: Challenge students to brainstorm major changes/*cimirluki* in the Sugpiat or Eyak subsistence harvest patterns in the last 150 – 200 years. Were village/*nunagpet* sites always permanent? How might a cash economy change life in the village/*nunagpet*? Changes/*cimirluq* caused by advances in technology? List all suggestions on the whiteboard and label as Changes/*Cimirluq*. Ask students to predict which will prove to be the five most important changes/*cimirluq* affecting subsistence resources and write them down.

Class Activities:

1. Describe the traditional Sugpiat and/or Eyak lifestyle of seasonal migration following subsistence resources. Beginning in the 19th century the Russian American Company and missionaries established trading posts and churches around the Chugach region. Their centralized services affected people’s movements from fish camps to hunting camps as they hunted for, and traded with, the Russians and converted to Russian Orthodoxy. The arrival of commercial canneries/*saalawit* around the turn of the 20th century further anchored the life of the village/*nunagpet*. Work at the cannery/*saalawik* was available only during the time when the Sugpiat and Eyak traditionally put up salmon for the winter, displacing subsistence efforts to cannery/ *saalawik* down times.ⁱⁱ
2. Share the following quotes from Elders regarding the changes in village life in the 20th century:

“*Suget ilalrit mikhnemni, 40s taumi 50s, iqallut maliglluki. Supet Arulayamek nunakuarlalrit Paluwigmen. Salayaq patungan Arulayagmi, suget naugtata’llrit Nanwalekgmen, Paluwigmen, Kiaut.*”

“People were still nomadic when I was a kid in the ‘40s and ‘50s. They migrated with the fish. Our people living in Portlock would come to Port Graham over land. When the cannery closed down there in Portlock, people moved to Nanwalek, Port Graham, and Seldovia”

- Elenore McMullen, past chief and Elder, Port Graham, 2004ⁱⁱⁱ

“Prior to the 1920s, we used to travel as part of our seasonal round of hunting, fishing, and gathering. The establishment of canneries disrupted our seasonal cycle of movement because cannery work was available during the months when we traditionally put up salmon for winter supplies. We stopped moving as much as we did in the past. Consequently, our hunting, fishing, and shoreline gathering became increasingly concentrated around the village. Sustained localized harvest likely had a profound effect on local marine resources.”

- Anne Salomon, Henry Huntington, Nick Tanape Sr.^{iv}

3. Have students make rough timeline of subsistence lifestyle changes/*cimirluq* using their predictions.
4. Introduce Elder and invite him or her to discuss the changes/*cimirluq* he or she has heard about or directly observed in subsistence harvest patterns over the last century.



Bidarki with knives, Port Graham

5. As a class discuss how more permanent village/*nunagpet* sites would have changed subsistence patterns.
6. Locate the villages of Nanwalek, Port Graham, and Seldovia on a map and distribute Bidarki Background reading and allow students time to read and underline key timeline info.

7. Divide students into small groups to combine and update their timelines of changes/*cimirluq* which include what they believe to be the five most important factors which contributed to the decline in bidarki populations in Port Graham and Nanwalek.
8. Invite the Elder to observe and join in group discussions.
9. Invite student groups to share and defend their results and compare to their original predictions. [*Timelines should not be limited to information provided by the Alaska SeaGrant handout. Changes in areas harvested and the size of the human population are also contributing factors.*]

Answers will vary but should include the following factors:

- 4500 years ago – Change from consumption of marine invertebrates to intertidal harvests
- 1780s – Advent of Russian trading posts (using barter system, not cash), churches centralized services changing village locations
- 1780s – mid-18th century overhunting of otter (which eat many marine invertebrates)
- 1880s – introduction of commercial fishing, canneries
- 1900s – introduction of cash economy
- early 20th century replacement of wooden dories with motorboats extended harvest areas
- 1911 Fur Seal Treaty protected sea otters (which then numbered as few as 2,000)
- 1920s-1950s Abundant harvests of marine invertebrates in Port Graham & Nanwalek (This is within living memory of many Elders and provides a baseline of size and abundance memories which confirms the bidarki population decline)
- 1980s – Widespread use of freezers in village allows harvesters to preserve and share – including sending subsistence food parcels to those living outside the village - more subsistence foods
- 1980s – Crash of Dungeness crab and shrimp fisheries means greater reliance on other intertidal food sources (serial resource depletion)
- 1989 – Exxon Valdez oil spill, ecological damage limits subsistence harvests
- Additional ideas: permanence of village sites due to cash economy and public schools reinforces uses of same subsistence harvest sites; village population increases with better health care

10. *Optional*: Discuss how community might adapt to preserve subsistence food populations.

Assessment:

- Students hypothesized which historic factors contributed to changes in harvests of subsistence foods.
- Students can explain the comparison of their predictions through research and discussion of the decline of the bidarki populations of Port Graham and Nanwalek.
- Students created, revised, and defended timelines of changes leading to the decline of the bidarki populations.
- Students correctly pronounced Sugt’stun or Eyak vocabulary words.

ⁱ Salomon, Anne K., et al. *Imam Cimiucia = Our Changing Sea*. Alaska Sea Grant College Program, 2011. p. 40

ⁱⁱ Salomon, p. 20

ⁱⁱⁱ Salomon, p. 20

^{iv} Salomon, p. 20



Bidarki Harvest, Port Graham, 2018

FFS 6-8 Village Resources.1.1

Alaska SeaGrant: Instructional Background Research <http://aswc.seagrants.uaf.edu/>

The Bidarki Story

“Bidarki” is a common name for species of chiton that is common in suitable rocky intertidal habitat of Southcentral Alaska. This name reflects the history of the area: “bidarki” is the Russian word for the type of boat that the animal resembles when it curls up into a defensive half-circle. *Katharina tunicata*, the scientific name for the species bestowed to honor Lady Katherine Douglas who first described it, has given rise to the common name “katy chiton.” Like all other members of the chiton family, the bidarki has a skeleton of eight overlapping hard plates surrounded by and held together by a fleshy girdle and protecting the large foot on its underside. In this species, the girdle is black and leathery and may cover the plates entirely like a jacket, which has given rise to yet another common name, the black leather chiton. Similar to snails, the mouth of chitons (at one end of the foot) contains a tongue-like, hard radula, which the animal uses to munch on the base of kelp fronds and scrape algae off rocks, including the calcified hard crust formed by coralline algae.

Intertidal ecologists began to focus more on bidarkis when they read about a northern Washington beach study that demonstrated their important role in structuring the community. The research, done by Dr. Robert Paine of the University of Washington, showed the bidarkis had “strong interactions” with

seaweeds they grazed. With bidarkis present, the coralline algae crust and other short, stubby algae thrive because the large kelps that would shade them out or overrun them with large holdfasts are kept in check. With bidarkis absent, the kelp community thrives instead. As the community shifts dramatically in structure, it shifts the nature of food and shelter for a host of other marine invertebrates and the substrate for seaweed species to settle and thrive.

Bidarkis have traditionally been of interest to Alaska Natives in the Sugpiaq (Chugach Alutiiq) communities of Port Graham and Nanwalek in Kachemak Bay as an important subsistence food, for more than 100 years. By the year 2000, however, concern was growing among community members who had observed a decline over the previous 10-15 years. The harvesters agreed that bidarkis were harder to find and smaller in size. The tribal governments became concerned about the future of the harvest.

Beginning in 2002, University of Washington scientist Anne Salomon traveled to Port Graham and Nanwalek to work with the tribal government and community members to study the cause of the decline. Unraveling the mystery required scientific investigations, experiments, and the assistance of a social scientist, Henry Huntington, to interview community members in order to reconstruct the history of the ecosystem. Insights from this historical information would not have been possible without the repository of traditional ecological knowledge that rested in the memory of tribal elders and other long-term residents.

Anne Salomon selected eleven study sites, through consultation with the elders and surveys of current bidarki harvesters, that included some heavily harvested sites as well as sites that were seldom or never harvested due to remoteness or sea conditions. She assembled teams of observers that included community members, and they made repeated counts of bidarkis in quadrat plots (the same sampling method that students practice in Investigation 4 of this unit). In addition, the team measured a number of variables at each site, including seawater temperatures, the maximum force of wave shock, and the number of other bird and marine mammal predators present at each site.

Henry Huntington, an Alaskan social scientist, reviewed historical records and midden pile remains dating back to more than 4,500 years BP, and conducted interviews with Sugpiaq elders about subsistence harvest practices, the composition of the harvest, and changes in the local ecology and economy that they had observed.

The analysis of quantitative data collected at the study sites led to the conclusion that, in agreement with the harvesters' qualitative observations, bidarkis were indeed smaller, on average, and in less dense concentrations at harvested sites closer to the villages. Experiments involving the exclusion of bidarkis from small areas also confirmed that the bidarki played the same "strong interactor" role in the intertidal areas of Kachemak Bay that it played in the earlier study done in Washington. Measurements of the other variables at the site yielded no consistent pattern relative to bidarki size and density, with the exception of the numbers of sea otters, which were more plentiful at the low-density sites.

The combination of natural and social science methods provided the following story and hypothesis about the cause of the bidarki decline:

- Prior to the Russian occupation in the 1780s, the Sugpiaq Natives were semi-nomadic, traveling from small settlements to seasonal camps for specific harvest activities. Remains from archaeological sites contain shells, indicating that their harvest of marine invertebrates modified the intertidal ecosystems for

at least the past 4,500 years. Remains from a 700-year-old site in Port Graham contained shells, with the greatest number being those of the large hairy triton snail (*Neptunea*).

- After the arrival of the Russian fur traders, the fur trading companies and the Russian Orthodox Church centralized services, which led to larger, more permanently established villages. The fur trade wiped out the sea otter in Kachemak Bay and Cook Inlet by the early 1900s.
- In the absence of sea otter predators, the chitons they preyed on became more abundant, along with other prey species such as sea urchins, sea cucumbers, crab, clams, cockles, mussels, and octopus.
- Commercial fishing and canneries gradually replaced fur trading by the late 1880s, which continued to promote larger, permanent settlements. Subsistence harvest efforts became concentrated around these villages. The cash economy was introduced in the early 1900s. Wooden dories were replaced by motorboats for fishing and travel.
- From the 1920s to the 1950s, people harvested the broad range of marine invertebrates that were available and abundant
- The sea otter was protected in 1911 and populations recovered, returning to waters and reefs off Port Graham and Nanwalek in the early 1960s.
- In the early 1980s, freezers began to be used to store food. Dungeness crab and shrimp fisheries crashed and marine invertebrate populations became less abundant.
- In 1989, the Exxon Valdez oil spill in Prince William Sound had large social, cultural, and economic impacts on the villages. Local hire of cleanup crews provided high incomes for a short period of time. Many people bought new and better boats and motors and began to travel farther for harvests.
- The hypothesis for the cause of the decline of bidarkis is that, after the return of the sea otter to the area, all of the factors described above resulted in a “synergistic serial depletion” of all of the marine invertebrate species that humans and sea otters both preyed on. “Serial depletion” refers to the historical sequence of depleting a series of prey species in a step-wise fashion, by focusing efforts on a preferred species (e.g., sea cucumbers, Dungeness crabs, hairy triton whelks) until it becomes scarce or too hard to find and then switching to the next preferred species (e.g., clams, cockles, bidarkis) after each formerly preferred species is reduced to such low numbers that local populations can’t recover. The combination of human and sea otter predation on each species was “synergistic,” in that the effect was more intense because of the combination of predators focused on the same prey species and then switched to the same alternative species.
- Based on this hypothesis, the localized depletion of bidarkis around the villages would then be at the end of a chain of events that created the permanent settlements (which localized human harvest effort), increased the efficiency of harvest through improved boat and food storage technology, and reintroduced sea otters to their former range. The end result was that each individual otter and human now consumes more bidarkis per capita because alternative food sources are scarce. (Another term that captures the hypothesis is “fishing down the food web.”)

One of the unique aspects of the bidarki story is the collaboration of scientists and community members in putting together and telling the story. The tribal governments participated in the study as the basis for a

local management plan for bidarkis. Armed with a better understanding of the causes of the decline, they are working on local rules to regulate the harvest so it is sustainable. The following is taken from a portion of the final report on the project Imam Cimiucia: Our Changing Sea, co-authored by “the bidarki team” of scientists and community members:

“You have to ask yourself, ‘Can that beach sustain that?’ You have to think about these things if we want our kids to enjoy it.” (Walter Meganack Jr., Chairman, Port Graham Corporation)

Where does this leave us? Thinking about the future, there are grounds for concern and reasons for hope. There is no question that the local ecosystem has changed. There is also no question that the human communities have changed. But these changes have also forced people to think about the future, to think about the consequences of their own actions. People are asking what they can do to make things better.

There are many ideas for how to better manage the actions of people from the villages. This is what management boils down to: changing human behavior. We cannot manage ecosystems but we can consider carefully how we act and how our actions affect the rest of the system. One starting point is within our villages themselves.

On the foundation of Sugpiaq knowledge and wisdom, we can take action to protect the animals we use and the ecosystem that sustains them. Those actions may be similar and/or different from the traditional management practices that the Elders refer to. A combination of local knowledge and science can be used to develop alternative management strategies. The effectiveness of those strategies can be monitored by using scientific techniques as well as traditional observations. A management plan for bidarkis may include size limits or seasonal closures during spawning season, protecting nursery areas, or closing some beaches entirely to harvest to promote the recovery of bidarki populations.

You have listened to a story told through the voice of many storytellers: Elders, village residents, an anthropologist, several photographers, and a marine biologist. Collectively, we have pieced together bits of our history and our combined knowledge to more holistically understand the complex drivers of change in our ocean home. By sharing this knowledge, we hope to inspire solutions for the future. By integrating knowledge systems and delving into our ecological and social past we hope to foster a culture of sustainability, one that acknowledges both ecological and human systems and the need to shift our time frame of thinking into the deep past and far into the future.

References:

Salomon, A.K. 2006. Investigating the relative roles of natural factors and shoreline harvest in altering the community structure, dynamics and diversity of the Kenai Peninsula’s rocky intertidal. Final report, GEM Project 030647, Exxon Valdez Oil Spill Trustee Council, Anchorage, Alaska.
http://www.evostc.state.ak.us/Files.cfm?doc=/Store/Final_Reports/532pdf&

Salomon, A.K, N.M. Tanape Sr., and H.P. Huntington. 2007. Serial depletion of marine invertebrates leads to the decline of a strongly interacting grazer. *Ecological Applications* 17(6):1752-1770.

Salomon, A.K., and L. Williams. 2007. Effects of chiton depletion and traditional ecological knowledge. *Bulletin of the Ecological Society of America*, July 2007, pp. 247-249.