



Shellfish Collection and Testing

Grade Level: 6th-12th grade

Subject: Biology, Marine Science

Recommended length of time for unit: 90 minutes each

Overview: This activity will be taking place on the second day of Clam Camp. The students will be learning about and participating in a subsistence shellfish harvest, which is a main objective of Clam Camp. A portion of the subsistence harvest will be sent to the Sitka Tribe of Alaska Environmental Research Lab (STA-ERL) for paralytic shellfish toxins (PSTs) testing, according to STA-ERL standard sample submission guidelines. The group will discuss the STA-ERL resources, such as sample PST testing, and how they can utilize tools to reduce potential risk of exposure to PSTs.

The beach substrate activity will be completed before this sample harvest lesson. During the substrate lesson students will form a hypothesis on where their target shellfish species will be found, and they will present a dig plan to the staff. Staff will coordinate with the entire group to ensure all shellfish sample species are collected, certain species are not over-harvested, and to maintain group social distancing and equipment distribution (not shared).

Objectives/Goals:

- Students will be able to identify in English and Tlingit the most common shellfish species in southeast Alaska: butter clams, blue mussels, cockles, horse clams, little neck clams, macoma clams.
- Students will be able to define subsistence shellfish harvesting and they should have a basic understanding of the historical, cultural, contemporary role in southeast Alaska.
- Students will participate in a shellfish harvest and learn about traditional subsistence harvest methods.
- Students understand why Sitka Tribe of Alaska Environmental Research lab and the Southeast Alaska Tribal Ocean Research network use blue mussels for biweekly biotoxin testing, and blue mussel's role as the canary in the coal mine.
- Students will understand how shellfish species retain biotoxins differently.
- Students will know how to submit their own shellfish samples for biotoxin testing and can follow the STA-ERL protocols for sample submissions. The students will

- understand the SEATOR resources available to them and that they can use the STA-ERL testing and data for their own risk mitigation when harvesting shellfish.
- Maintain COVID safety procedures and social distancing while conducting outdoor, hands-on science education activities.
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Part One- Shellfish Species Identification

Materials: Students should provide their own outdoor, weather appropriate clothing such as rain gear, boots. Field gloves will be provided to the students. Rite-in-the-Rain data sheet and pencil if students want to take notes.

COVID safety: The sample site should provide enough space for masked students and staff to safely spread out during species identification walk and throughout the digging process. Students should have their own field gloves, shovel, bucket to avoid contamination.

Species Identification: Students and staff will walk the shoreline of the beach using the Southeast Alaska Identification document. Staff will ask students to find empty shells, laying on the beach without animals, of blue mussels, cockles, butter clam, littleneck clam, and macoma. If possible, the students should also look for horse clam shells, but these are unlikely to be on the beach. If Sitka Tribe staff has some at the office they should bring example shells with them. The students are more likely to find horse clams during the digging process. Staff will also play a recording and cover the Tlingit vocabulary for each of the shellfish species. Once the group has confirmed all the common shellfish species in southeast Alaska, the staff will point out the outer anatomy of shellfish, particularly the umbo and how to properly place shellfish back in their habitat if they are not being harvested. Shellfish should be placed with the long edge facing up at the same depth that they were found, and dark should be gently placed back over them (do not hard-pack dirt).

Staff will also discuss clam gardens and the traditional subsistence harvesting of shellfish in Sitka and in the region. Students will be asked to share what they have been taught about shellfish harvesting and that traditional, local knowledge will be discussed. For example, the commonly shared rule to only harvest shellfish in months containing the letter 'r;' the group will discuss the scientific significance of this rule (blooms in the area generally occur in late spring, summer, and early fall) but the exceptions to the rule and changes due to climate change.

Sitka Tribe of Alaska (STA) staff will also example why blue mussel shellfish are the indicator species for biotoxin testing (because they are easier to harvest from rocks, they eat constantly, they flush toxins quicker). A STA staff member will also explain to students how some shellfish species can hold onto toxins for longer, for example, butter clams may hold onto toxins for up to 2 years after a harmful algal bloom event.

Part Two- Harvesting

Materials: All the materials listed above plus shovel and buckets.

Digging Shellfish: *Based on the substrate activity, students should make hypotheses about where the most shellfish will be found and which species.*

Every student will have their own shovel. Students will dig holes and identify the number and species of shellfish found and record in their field notebooks. Staff will coordinate with the students to collect appropriate numbers (at least 6 organisms and 100 grams of tissue) for each shellfish species to be tested (blue mussels, butter clams, cockles, littleneck clams). Staff will float between students collecting sample shellfish until enough of each species has been collected for biotoxin testing.

Shellfish that are not used for biotoxin testing will be properly placed back in their holes and covered back up. All holes need to be returned to pre-digging state before the group leaves the beach. Also, the sample shellfish and equipment must be rinsed in ocean water before leaving.

Part Three- Debrief

Discussion: The group will discuss the shellfish they found and share any observations that they made during digging. Some observations could include: how close to shoreline they found the most shellfish, did they decide where to dig based on holes in sand or clams squirting water, how far down did they need to dig to find shellfish, what are were the most shellfish discovered, what size were the shellfish, what species did they find, did holes contain one species or multiple species living together, how many shellfish per hole?