Clams Casino

Activity Description
Students learn the importance of clean water in shellfishing, and the unique anatomy of a clam. By playing the game, students will learn the different things that affect the amount of clams that are being sold and eaten.

Take Home Message
By being aware of what goes into the water, we can help reduce the amount of shellfish bed and beach closing that happen on the Cape each year. Residents of Cape Cod are also capable of helping keep the clams healthier by putting fewer toxins in water.

Massachusetts Framework
Life Science (Biology)
Grades 3-5: Adaptation of Living Things #10.
Grades 6-8: Living Things and their Environment #13 AND Changes in Ecosystems over time #17

Materials
- **Foam board**
- **Clam Anatomy—pieces of the clam all labeled on back**
- **5 small wicker baskets**
- **Wheel**
- **Shells**
- **Wampum**
- **Map of shellfish beds**
- **Aquaculture Poster**
- **Pictures of shellfish**
- **2 warning signs**

Set-Up
Hang up poster, signs and map. Put wheel on table, make sure it can properly spin and that all of the wheel sections can be read (may have to be adjusted or rewritten several times during the day). Separate the small shells evenly into the baskets, 10 shells per basket.
Make sure the board is bare, check in the envelope that all the pieces of the clam are accounted for.

Background Vocabulary
Bivalve—an mollusk which has a shell consisting of two round plates called valves joined at one edge by a flexible ligament called the hinge. The shell is typically bilaterally symmetrical
Mantle—the body of the clam, gives the shell its shape

Siphon—tube like structure in which water flows. Water flow is used for multiple purposes like locomotion, feeding, respiration and reproduction. Clam has inhalant and exhalant siphons, one for intake and one to remove water from its mantle cavity.
Filter feeder—animals that feed by straining suspended matter and food particles from water, typically by passing water over a specialized filtering structure.
Bio accumulation—the accumulation of substances, occurs when an organism absorbs a toxic substance at a rate greater than that at which substance is lost.

Background Science

Like all shellfish, the body structure of the hard clam is designed to draw water with oxygen and food particles into the mantle cavity. This is referred to as filter-feeding. Food and other materials are taken in through the incurrent siphon. Tentacles on the siphon detect excessive concentrations or oversized particles in the water and cause siphons to close. Particles brought into the siphon attach to mucus secreted by the mantle and the gills. These particles are sorted by size and weight, with undesirable materials such as sand and silt being rejected. Lighter particles are transported from the gills to the palps, a pair of folds on each side of the mouth, where further sorting takes place. Material accepted as food goes into the mouth, to the stomach and through the intestine. The anus opens near the excurrent siphon, from which the waste is carried away by outgoing current.

If pollutants such as bacteria, toxic metals and other materials are present in surrounding waters, they too will be taken in by the hard clams during the digestive process. As the clam continues to filter feed, the pollution continues to accumulate in the clam's body. The clam itself may appear to be healthy but the contaminants can be passed on if ingested. If moved to clean waters, the clam has the ability to eliminate the contaminates from its body.

--- "Beneath the Shell" A Teacher's Guide to Nonpoint Source Pollution
New Jersey Department of Environmental Protection

Activity Procedure/ Script

- **Introduce yourself to the students. Tell them that you are going to learn about clams, their anatomy and the importance of clean water in shellfishing.**
- **Ask the students if they have ever been clamming or shellfishing**
- **Ask them to name some shellfish that are here on the Cape**
    - After they suggest some of the shellfish here, tell the students we are going to be discussing clams
    - Some shellfish examples---clams, oysters, mussels, scallops
- **Pull the whole clam picture out of the envelope and say that we are going to go over some clam anatomy before we play our game.**
    - Place each of the pieces of the clam into the shell as you explain the anatomy
    - Bivalve shell—shell consisting of two halves, can open and close using its abductor muscles
    - Mantle—the thick sheet that protects the clam, gives the shell its shape, holds the important parts of the clam like heart, and stomach
    - Foot—clams use their foot to move and bury itself into the sand
    - Siphon – clams have two siphons, one to bring water and food in (inhalant siphon), pushing it towards the clams mouth and one to get rid of water after food is eaten (exhalant siphon). The siphon is like a straw, collecting all that it sucks

in, after the clam has collected the food it wants from the water it blows the water back out its exhalant siphon.

- **Tell the students that clams are considered "bio accumulants". Ask them if they know what that word means.**
    - Explain to the students that it means that clams absorb more toxic substances than they can remove. Because of this, it is a lot easier for them to become sick and or poisoned. Let them know that when the clams have too many toxins in their body they are unsafe to eat.

GAME

- **Ask if they have ever heard of shellfish beds closing or other shellfishing problems and why do they think that might happen**
    - They may give examples of disease, trash or rain. Other reasons include
    - Red tide, algae blooms, serious storms, groundwater runoff, sewage in water from septic tanks, an influx of boats in the area, domestic and wild animal waste
- **Explain to them that shellfish beds close like beaches when the water is in poor condition.**
    - Because of this, less shellfish can be sold and eaten.
- **Explain to the students that the clams are capable of cleaning themselves out from the bad stuff we put into the water but only when given a good amount of time and healthy water.**
- **Tell the students that today they are going to be shellfishing for clams. Give each of them their bucket of shells (10 shells in each bucket) , saying they now own a bed of clams and each shell represents the amount of clams they are able to get from their bed. Each wheel turn is an obstacle that shellfishermen may have to deal with, and that many of them are caused by people. Shellfishing is a game of chance because many things that affect their productivity is out of the control of the people who own the beds. With each wheel turn, make the students remove some clams from their bucket and give them back to you or give the students more clams according to the spin.**

- Oil Spill -2
- Clean Water +1
- Large Rainstorm -1
- Good growing season +1
- Predators -1
- Minimal predation =1
- Overharvesting -3
- Town creates culch beds +2
- Red Tide -2
- Reduced run-off +3
- QPX -1
- People follow regulations

- **Once the students have spun the wheel twice ask them about their results and why?**
    - They might say that its hard to fish when there are so many things getting in the way, that the reasons the beds are getting closed so much is because of the pollution we create
    - Emphasize that beds are affected because of our carelessness, and that beaches are affected as well.
    - **Ask the students ways that we can prevent this.**
    - Some might suggest less pollution, pick up dog poop, less runoff

- Explain to the students how important shellfishing is here on the Cape, that there are many people who rely on shellfish to make a living, and is eaten all the time. If we continue to mistreat the water people will not be able to make money off of shellfish and we will no longer be able to enjoy them. We also do not want to put bad things in the water because eventually we will have to eat them again! Clams are able to fix themselves, but only when we work with them to make the water cleaner.

** If there are prizes available give the student with the most clams left something**

Clean Up

- Put shells back into the large bag
- Remove clam pieces and put them back into the envelope
- Take down posters and signs
- Dismantle wheel, being careful not to remove the different sections