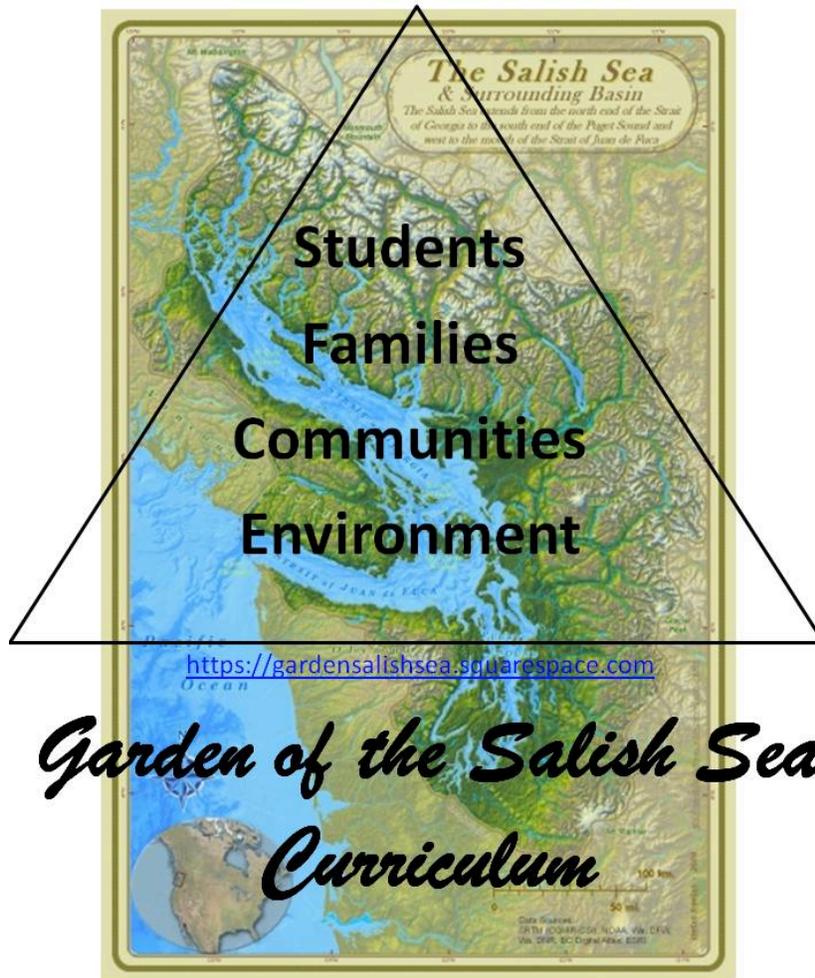


My Garden of the Salish Sea Science Notebook



Name _____

Teacher _____



Garden of the Salish Sea Curriculum:

Funded by Whatcom Community Foundation, the Alcoa Foundation and by donations

Our Goal: Motivate students, families and communities in practicing stewardship of local watersheds by understanding shellfish, coastal ecosystems and human impacts. Inspire students to study science.

Our Mission: Support a healthy Salish Sea that can nourish us, through hands-on (K-12) education and community outreach.

Schedule:

- Day 1 – Introduction to Garden of the Salish Sea program (pages 1-10)
- Pre-Day 2 – Video Questions: The Other CO₂ Problem (page 11)
- Day 2 – Ocean Acidification Investigations (pages 12-16)
- Post-Day 2 – Exploring Shellfish Issues (page 17)
- Post-Day 2 – Coastal Communities Forum (page 18)
- Day 3 – Shellfish Identification (pages 19-23)
- Day 4 – Field Investigations (pages 24-29)
- Post Day 4 – Clam Survey Data Comparison (page 30)
- Day 5 – Reflection on Salish Sea Challenge (page 31)

Funded by:



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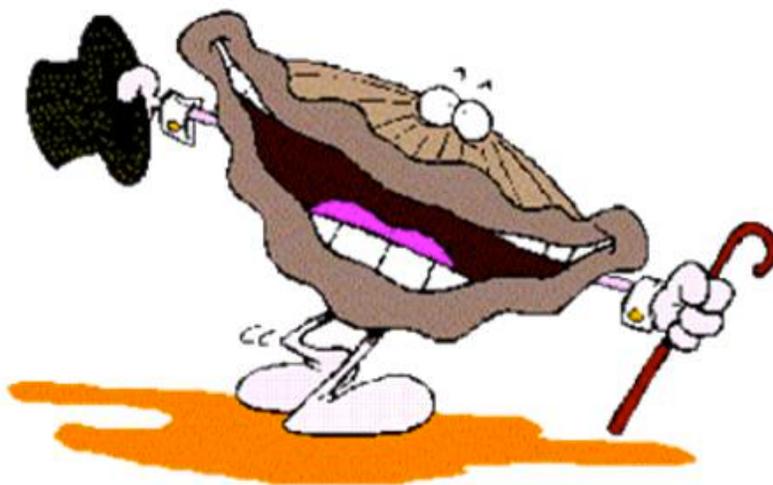
Vocabulary

- **Bivalve** – a mollusk with two parts of a shell attached by a hinge; muscles, clams and oysters are examples.
- **Fecal Coliform Bacteria** – bacteria from the feces (poop) of warm-blooded animals that can get into the water and prevent shellfish from being harvested safely.
- **Filter Feeder** – Type of animal that gets its nutrients from sorting out tiny plants and animals from the water as it breathes.
- **Intertidal Zone** – the area along the shore of the oceans that is exposed during low tides and covered during high tides. Intertidal means between the tides. The intertidal zone is an important habitat for many animals including shellfish and juvenile salmon.
- **Mollusk** - Soft bodied invertebrates that often make a shell and appeared on earth 500 million years ago.
- **Ocean Acidification** – the slow transition in the world’s oceans becoming more acidic in part due to human influences; primarily the combustion of fossil fuels and increased carbon dioxide in the atmosphere.
- **Photosynthesis** – A process used by plants, including phytoplankton, to make food from light and carbon dioxide in the air.
- **Phytoplankton** – Microscopic, drifting plants. These are a type of plankton.
- **Plankton** – Greek for “drifter.” Microscopic plants, animals, or bacteria that are carried by and drift with the current. They provide a crucial source of food to larger organisms.
- **Salish Sea** – Body of water that extends into both Washington State and British Columbia.
- **Shell Midden** – These are often found by archaeologists, and are left over shells and other deposits from people who ate shellfish and disposed of the shells in a pile. Shell middens are like ancient garbage dumps and provide insight on what people used to eat and where they lived.
- **Spat** – A juvenile oyster that as it changes into an adult, develops its shell and attaches to a substrate like rock or shells. This is one of the most vulnerable stages in the oyster life cycle to ocean acidification.
- **Water Quality** – the state of the water; can be measured in pH, dissolved oxygen, temperature, turbidity, absence or presence of bacteria, and/or salinity.
- **Zooplankton** – Tiny free-floating animals. These are a type of plankton.



Cool Facts about the Salish Sea & Shellfish

- The Salish Sea is named after the Coast Salish peoples who have lived along its shores for over 10,000 years.
- The Salish Sea includes the Straights of Juan De Fuca, the Puget Sound, the San Juan Islands, the Gulf Islands, the Straits of Georgia, and Hood Canal.
- Over 7 million people live within the watershed of the Salish Sea.
- An oyster can filter more than 50 gallons of water per day. There once were so many oysters in the Chesapeake Bay, they could filter a volume of water equal to the entire Bay (about 19 trillion gallons) in a week. Wow!
- Most oysters can make a pearl. Natural pearls are made when foreign matter inside the body is covered with layers of *nacre*, the same calcium and protein-based material used to make shells.
- There are 30,000 species of bivalves and more than 8,000 species of them are oysters.
- Shellfish have growth rings that record the seasons.
- Olympia oysters, once abundant in the Salish Sea are now scarce and efforts are now being made to bring them back.





Garden of the Salish Sea Curriculum
Day 1: Introduction and Lab Inquiries
Wade King Elementary
Third Grade



NAME: _____

☆ = activity can be done at a later time

☆ **Station #1: Salish Sea Stewards**

Responsibility: Being a steward means making a commitment to take care of something.

Name 3 things that you already take care of? Some examples are chores and taking care of a pet.

- 1) _____
- 2) _____
- 3) _____

Looking at the ways we can take care of the Salish Sea on the Challenge sheet, what things can you do to become a steward? Name 3.

- 1) _____
- 2) _____
- 3) _____

What are some things that you already do at home with your family to be Stewards of the Salish Sea?

How often will you do these actions? _____



Remember, this is a marine marathon! We will be revisiting this idea of how we can make being a Salish Sea Steward an every-day habit throughout the unit!



Station #2: Shellfish in Time and Place

Shellfish are **mollusks** that appeared on earth more than 500 million years ago, based on the fossil record. Marine shellfish live or lived along coastlines around the world.

Name 3 places where shells are labeled on the map:

1. _____
2. _____
3. _____



☆ The Salish Sea includes the Puget Sound, Straits of Georgia, Straits of Juan De Fuca, the Gulf Islands, and the San Juan Islands. What two countries surround the Salish Sea?

- 1) _____ 2) _____

Causation: There is a place high up near Mount Baker called Chowder Ridge where fossilized shells can be found. Why do you think there are fossils of sea creatures in the mountains? (Hint: Take a look at #10 on the *Shellfish Around the World* sheet).



Fossils are the remains of buried prehistoric animals like shellfish.

Coast Salish Peoples and Culture Station

Connections: The Salish Sea is named for the Coast Salish Peoples, Native Americans who have lived near its shores for over 10,000 years. How do we know they ate shellfish long ago? (Hint: Look in your vocab section and reflect back on the introductory power point. There is a midden close to N. Chuckanut Bay where you will do your field investigation.)

☆ Station #3: Nutrition Station



Focus on Food: Shellfish are an important source of food and protein around the world.

What shellfish have you eaten? (Clue: what about clam chowder?) _____

What foods are made from sea vegetables? _____



Station #4: Watershed Model Station

First, complete the watershed activity. Then answer the questions below.



What are 3 sources of pollution in the watershed model?

1. _____
2. _____
3. _____

★ **Compare & Contrast:** Draw a picture of a healthy watershed and ocean **intertidal zone** and compare to an unhealthy watershed and ocean **intertidal zone**.

Healthy watershed and intertidal zone

Unhealthy watershed and intertidal zone



Station #5: Oyster Dissection

In the box, make a scientific drawing of the oyster. Find and label at least 3 body parts of the oyster.



Using the Oyster Diagram Flip Cards, explain the functions of the parts of the oyster that you found or what they do on the lines below.

1. _____
2. _____
3. _____



Station #5: Oyster Dissection

Oyster Anatomy

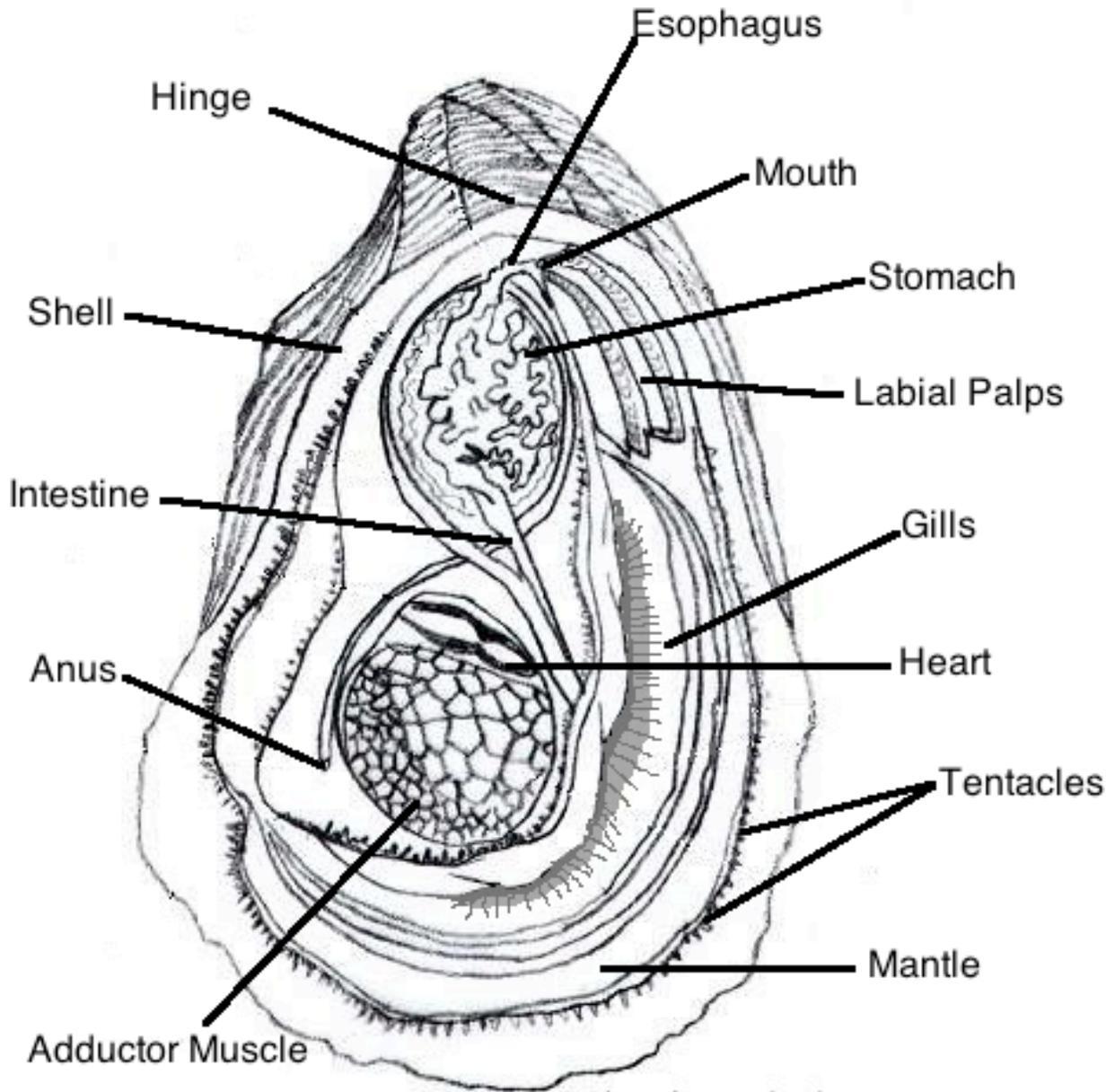


Image from www.busybee.org
edited by Andrea Reiter



Station #6: Oyster Observation



There's more going on inside this shell than meets the eye.

Observe the oysters in the live tank. Though they may not be moving much, what 3 things are they doing?

- 1) _____
- 2) _____
- 3) _____

Function: What organ is the oyster using to breathe? _____

Connection: How does an oyster breathing and filtering the water help other plants and animals in the ocean? _____

☆ **Focus on Math:** If 1 oyster filters 50 gallons of seawater each day, how many gallons would 3 oysters filter in a day, in a week, and in a year? Show your work.

_____ gallons/day

_____ gallons/week

_____ gallons/year

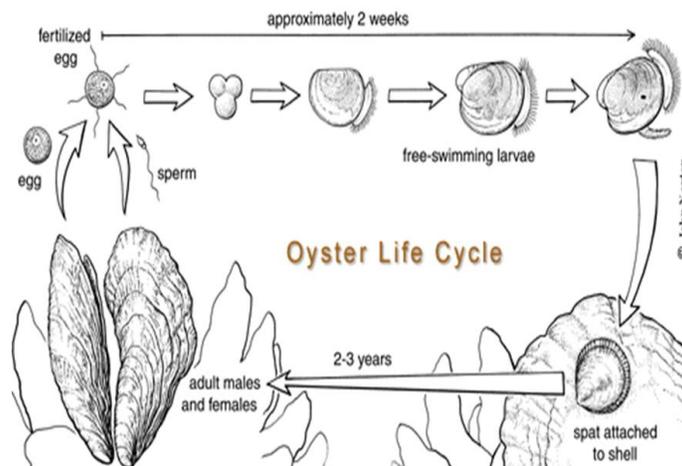


Station #7: Food Web Foundations

Connection: What microscopic organisms might an oyster eat?

Connection: What might eat an oyster?

Station #8: Shellfish Life Cycle



Function: How does an oyster move before it becomes an adult?

What is a juvenile oyster called when it has just attached to a substrate (rock or shells)? (Clue: rhymes with "splat" and is in your vocab section.)

Connection: If oceans become more acidic, shellfish will have trouble forming what part of their body?

Connection and Change: How might the food web change if there were no more oysters?



★Whale Jenga

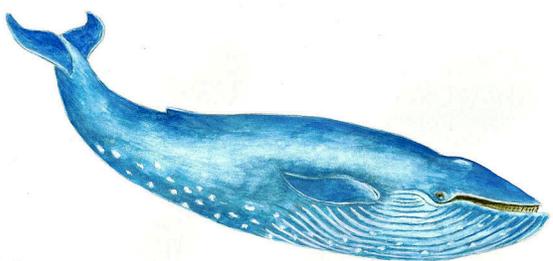
(To be played after all other stations are completed and questions answered)

In your own words, what happened to the ocean when you played Whale Jenga?

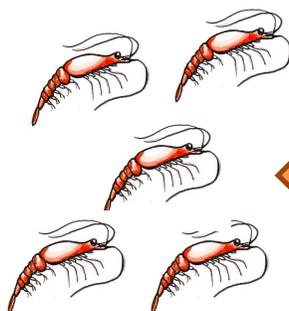
What did you discover about human influences on the environment because of this game?

Can you think of some ways you can protect the oceans after playing Whale Jenga? What are they?

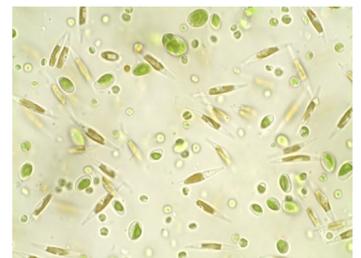
Whale Jenga Food Chain:



Baleen Whale



Krill

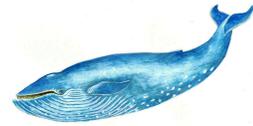


Phytoplankton





☆ Krill – A Whale of a Game!



(To be played after all other stations are completed and questions answered)

When extra time allows, play *Krill – A Whale of a Game*, reading the instructions first. After playing the game, use the space below to draw and label a picture of at least one complete food cycle you observed while playing the game.



☆ **Day 1 Review:**
Thinking about today's activities

Reflection: What are three things you learned?

1. _____
2. _____
3. _____

Reflection: What are two things that you already knew?

1. _____
2. _____

Reflection: What is one thing that surprised you?

1. _____

Make a drawing of the coolest thing that you observed or learned.

