



What the Aquarium Needs From Your School

Please have the following items available at least 30 minutes before the first scheduled program:

- ❖ A presentation room on ground level that can be darkened slightly for PowerPoint presentation and accommodates the total number of students for each program
- ❖ Four six-foot long tables for displaying teaching tools
- ❖ An AV cart or small table for the Aquarium's AV equipment
- ❖ A slide screen (if your school's slide screen is larger than 58" X 78")

Our staff will check in at the office when they arrive and will need:

- ❖ Easy access to the presentation area for unloading program materials
- ❖ An orientation of the presentation area from your custodian regarding access to electrical outlets and instructions on how to turn lights on and off

The Aquarium's Education staff will arrive at your facility approximately 30 to 45 minutes before the first scheduled program.



Important Information for Teachers

Because our staff is following a tight schedule and your school time is valuable, please share the following points with your students before the program:

- Students will be asked to sit on the floor during the presentation. Please instruct your students to sit cross-legged and flat on their bottoms so that everyone can see the presentation.
- We suggest that the younger grades sit in the front with the older grades behind them.
- The Aquarium's instructors may be asking for student volunteers during some programs. Instructors will choose students according to listening skills and body size.
- Younger students often confuse the concept of questions and statements. Please review the difference with them. Questions are appropriate both during and after the presentation. (Time constraints may limit the opportunity for questions during the presentation – students may be asked to save their questions until the end of the program.)
- If a student has a question during the Q&A period, a raised hand will help the instructor answer it.
- Please remind students that they should not be talking while another person is talking, whether it is the instructor or another student with a question.
- We will be bringing biofacts (sea urchin teeth, whale bones, mammal fur, etc.) Your students will have a chance to handle and look at these biofacts at the end of their program. **These biofacts are fragile and must be handled with care.**
- The instructor will speak to the whole group for approximately 30-45 minutes, followed by 15 minutes when students will visit the biofacts tables. Only two classes will visit the tables at a time, beginning with the younger grades. While you are waiting, have your students review what they learned during the program and come up with at least one new question to ask the Aquarium staff when they reach the tables.
- Groups who use their best listening skills will have more time at the end of the program to see the biofacts and interact with the program instructors.

We appreciate your help in addressing these issues!



No Bones About ‘Em

Grades K-2

Dear Teacher:

Here are some instructional objectives for and an outline of the outreach program your school has scheduled for your students. Please use them to help direct your preparation and to review what was learned during the assembly program.

Goal: To identify four different tide pool invertebrates and their adaptations that help them to survive in that environment.

Cognitive Objectives:

1. Explain that tide pool invertebrates have adaptations that help them survive in the rocky intertidal zone.
2. Explain where tide pools are found.
3. Identify four different tide pool animals: barnacle, sea star, sea anemone and octopus
4. Compare and contrast how these animals are covered, protect themselves, move and eat.

Affective Objectives:

1. Students will feel that their stewardship of the rocky intertidal zone is important for its survival.
2. Students will be inspired to learn more about tide pool invertebrates.

Benchmark Correlations:

- SC.03.LS.01 Recognize characteristics that are similar and different between organisms.
- SC.03.LS.02 Describe the basic needs of living things.
- SC.03.LS.04 Describe a habitat and the organisms that live there.
- SC.05.LS.05 Identify how some animals gather and store food, defend themselves, and find shelter.

Time: 45 minutes

Program Outline:

I. Tidepool Habitat

- A. A tidepool is a pool of salt water in the rocks found during low tide.
- B. What would it be like to live in a tide pool?
 1. High tide
 - a. Crashing waves
 - b. Ocean predators
 - c. Brings food and oxygen
 2. Low tide
 - a. Exposed to sunlight



OREGON COAST AQUARIUM

- b. Exposed to land predators
- c. Vulnerable to tidepooling humans

II. Adaptations

- A. An adaptation is a body part or behavior that helps an animal to survive in its environment.
- B. The following invertebrates have feeding adaptations that help them survive in a tidepool habitat.

III. Barnacles

- A. Barnacles are related to shrimp, crabs and insects.
- B. After their planktonic stage, barnacles glue their heads to a hard surface (rock, mussel, whale) and build a protective shell around themselves
- C. Barnacles eat plankton, using their legs to catch food.
- D. Using your legs to catch food has some advantages.
 - 1. Head is protected.
 - 2. Feet can be brought inside of the shell for protection.

IV. Sea stars

- A. Unlike barnacles, sea stars aren't attached to one place for their entire life. Sea stars use their tube feet to move around on the rocks and search for food.
- B. Sea stars are scavengers that eat mussels, barnacles and many other tidepool animals.
- C. A sea star's mouth is found in the center of the underside of its body.
 - 1. Sea stars take out their stomach and put it on the food, instead of putting the food in their stomach.

V. Sea anemones

- A. Although sea anemones may look like plants, they are animals that are related to jellyfish.
- B. An anemone's mouth is on top of its body in the center of its tentacles.
 - 1. Anemones use their tentacles to sting prey and bring it into their mouths.

VI. Octopuses

- A. Octopuses are soft bodied like anemones, but are related to snails, slugs, clams and squid.
- B. Octopuses have eight arms covered with suction cups to catch their food.
- C. An octopus' mouth is located in the center of its body, underneath its arms
 - 1. Octopuses have a beak for crushing through the hard shells of their prey.
 - 2. They use their radula (rough tongue) to scrape the meat out of these shells.

VII. Feeding adaptations review

- A. Review feeding adaptations with the "Tidepool Tango" song and dance.



VIII. If you ever visit the rocky shore, look carefully as you walk along the rocks and never walk in a tidepool. The animals that you learned about today have many adaptations to help them survive, but most of their adaptations won't protect them from your feet.



From Tubefeet to Tentacles

Grades 3-5

Dear Teacher:

Here are some instructional objectives for and an outline of the outreach program your school has scheduled for your students. Please use them to help direct your preparation and to review what was learned during the assembly program.

Goal: To familiarize students with rocky intertidal invertebrates found off the Oregon coast and their adaptations that help them to survive in this environment.

Cognitive Objectives:

1. Explain where the rocky intertidal zone is found.
2. Name three factors (waves, tides, predators) that affect an animal's survival in the rocky intertidal zone.
3. Explain that adaptations are body parts that help intertidal invertebrates live in this environment.
4. Compare and contrast how a barnacle, sea star, urchin, sea anemone, and octopus protect themselves, eat and move.
5. Explain the appropriate adaptation of a specific rocky intertidal animal for a given environmental stress and how it works.
6. Describe how human behavior can affect the rocky intertidal zone.

Affective objectives:

1. Students will value the rocky intertidal zone as an important ocean ecosystem.
2. Students will feel that their stewardship of the rocky intertidal is important for its survival.

Benchmark Correlations:

- SC.05.LS.01 Group or classify organisms based on a variety of characteristics.
- SC.05.LS.03 Describe basic animal structures and their functions.
 - SC.05.LS.03.01 Associate specific structures with their functions in the survival of the organism.
- SC.05.LS.05 Describe the relationship between characteristics of specific habitats and the organisms that live there.
 - SC.05.LS.05.04 Explain the relationship between animal behavior and species survival.
 - SC.05.LS.05.05 Describe the living and non-living resources in a specific habitat and the adaptations of organisms to that habitat.
- SC.05.LS.06 Describe how adaptations help a species survive.
 - SC.05.LS.06.01 Describe changes to the environment that have caused the population of some species to change.
 - SC.05.LS.06.02 Identify conditions that might cause a species to become endangered or extinct.



SS.05.GE.07 Understand how physical environments are affected by human activities.

SS.05.GE.07.02 Describe how human activity can impact the environment.

Time: 45 minutes – 1 hour

Program Outline:

I. Rocky intertidal zone

A. Challenges for rocky intertidal zone animals.

1. Being knocked off a rock by a crashing wave
2. Being swept out to sea by a strong, pulling current
3. High tide (twice a day)
 - a. Many large swimming predators come in
 - b. Strong currents can sweep an animal out to sea as the tide goes out
4. Low tide (twice a day)
 - a. Exposed to predators such as gulls, raccoons, dogs
 - b. Exposed to sunlight
 - 1) Animals could dry out
 - 2) Water temperature in tidepools gets warmer; less oxygen
 - c. Exposed to rain; less salt in the water can be damaging
5. Exposed to tidepooling humans

II. Adaptations for survival in the rocky intertidal zone

- A. Adaptation: a body part or behavior that helps an animal survive in its environment
- B. We have adaptations for living on land (e.g. hands, feet, eyelashes)

III. Barnacles (Phylum Arthropoda; means “jointed legs” – related to crabs, shrimp, insects and spiders)

A. Protection

1. Glue their heads to the rocks and build a hard volcano-shaped shell around their bodies
2. Close their operculum to keep water inside
3. Hard outer shell also protects from predators
4. Try not to step on barnacles

B. Movement

1. Can't move from place to place; permanently glued to the rock

C. Feeding

1. Kick food into their mouth with their eyelash-looking legs
2. Feed on plankton

IV. Sea Stars (Phylum Echinodermata; means “spiny skinned” or “hedgehog skinned” – related to sea urchins, sand dollars and sea cucumbers)



A. Protection

1. Spines protect from predators
2. Tube feet for hanging on
3. Never try to pick up a sea urchin off a rock

B. Movement

1. Hundreds of suction-cup tube feet for moving

C. Feeding

1. Tube feet for grabbing food
2. Tube feet for smelling
3. Eat seaweed

V. Sea Urchins

A. Protection

1. Spines protect from predators
2. Tube feet for hanging on
3. Never try to pick up a sea urchin off a rock

B. Movement

1. Hundreds of suction-cup tube feet for moving

C. Feeding

1. Tube feet for grabbing food
2. Tube feet for smelling
3. Eat seaweed

VI. Sea Anemones (Phylum Cnidaria; means “those that sting” – related to jellies and corals)

A. Protection

1. Ring of tentacles to sting predators
2. Hold water inside to keep from drying out
3. Hold onto rocks with round, flat “foot”
4. Do not step on sea anemones or poke them

B. Movement

1. One round flat “foot”, called a pedal disc, for moving
2. Move slowly – about an inch a day

C. Feeding

1. Sting their prey with tiny stinging structures, called nematocysts, stored in their tentacles
2. Eat plankton, small fish, crabs, sea stars
3. Bring their tentacles to their mouth (looks like a belly button)
4. Don't stick your finger in an anemone's mouth; two-way digestive system

VII. Octopuses

A. Protection

1. Hiding
 - a. Change color to blend in
 - b. Fit through small holes



2. Squirt ink to fool predators; deceptive camouflage

B. Movement

1. Siphon for swimming; jet propulsion
2. Walk along the rocks using their long, suction-cup-covered arms

C. Feeding

1. Grab prey with suction-cup-covered arms
2. Eat animals with hard shells like sea urchins, crabs and shrimp
3. Crack open the hard shells with their beak

VIII.. If you ever visit the rocky shore, look carefully as you walk along the rocks and never walk in a tidepool. The animals learned about today have many adaptations to help them survive, but most of their adaptations won't protect them from your feet.



Oregon Coast Aquarium Outreach Program Feedback

No Bones About 'Em & From Tubefeet to Tentacles

Please help us improve our outreach programs. Each teacher in attendance should complete this sheet and return it to the Aquarium. Your comments are important to us. Thank you!

School: _____

Teacher Name: _____ Grade: _____

Please evaluate the outreach program in which your students participated:

1. **Information level:** ✧ too basic ✧ too technical ✧ just right
Please explain: _____

2. **Instructor presentation:** ✧ too basic ✧ too technical ✧ just right
Please explain: _____

3. **Overall impression:** ✧ too basic ✧ too technical ✧ just right
Please explain: _____

Please indicate which of the provided program materials you used to help prepare your students for their outreach visit:

_____ Pre and post visit suggestions	_____ Tidepool Flash Cards
_____ Rocky Intertidal Background Information	_____ Tidepool Dilemma Cards
_____ Rocky Intertidal Vocabulary	_____ How Big Is It?
_____ Acorn Barnacle Fact & Coloring Sheet	_____ Rocky Intertidal Resources
_____ Sea Star Fact & Coloring Sheet	_____ English/Spanish Translation
_____ Sea Urchin Fact & Coloring Sheet	_____ Certificate
_____ Sea Anemone Fact & Coloring Sheet	_____ None of the Above
_____ Octopus Fact & Coloring Sheet	

What types of materials would you have liked us to include?



OREGON COAST AQUARIUM

What part of the program did your students enjoy the most?

How did this program fit into your curriculum? Did it help you address common curriculum goals and benchmarks?

What could we do to make this program a better learning experience for your students?

Additional comments:

**Public Programs Department
Oregon Coast Aquarium
2820 SE Ferry Slip Road
Newport, Oregon 97365**



OREGON COAST AQUARIUM

Marine Vocabulary

English/Spanish Translation

English	Spanish
A	
Abalone	Abalone
Adaptation	Adaptación
Ampullae of Lorenzini	Ampollas de Lorenzini
Anchovy	Anchoa, Boquerón
Anemone (sea)	Anémone del mar
Aggregating anemone	Anémone agregada
Green anemone	Anémone verde
Pink tipped anemone	Anémone punta de rosa
B	
Baleen	Ballena
Baleen whale	Misticetos
Barnacle	Percebe
Acorn barnacle	Percebe de bellota
Giant barnacle	Percebe gigante
Gooseneck barnacle	Percebe de cuello de ganso
Blubber	Grasa de mamífero marino
Bony fish	Pez óseo
Breach	Saltar del agua
Bryozoans	Bryozoos
C	
Cartilaginous fish	Pez cartilaginoso
Caudal	Caudal
Cetacean	Cetáceo
Clam	Almeja
Coralline algae	Alga coralina
Crab	Cangrejo de mar, cambara, caneta, jaiba
Hermit crab	Cangrejo hermitaño



Kelp crab	Cangrejo de alga
D	
Denticles	Dentículos
Dolphin	Delfín
Dorsal	Dorsal
E	
Echolocation	Localización por eco
F	
Feather boa kelp	Alga de pluma
Fin	Aleta
Fish	Pez (pl.: peces)
Flipper	Aleta pectoral
Fluke	Aleta anal, cola
G	
Giant kelp	Alga gigante
Gill	Agalla
H	
Hydrodynamic	Hydrodinámico
I	
Intertidal zone	Zone inundada por la marea
Invertebrate	Invertebrado
J	
Jellyfish	Medusa
K	
Keratin	Queratina
Krill	Krill
L	
Lateral line	Linea lateral
Limpet	Lapa
Lobster	Langosta
M	
Marine mammal	Mamífero marino
Mussel	Mejillón



N	
Nematocyst	Nematocisto, célula que pica
Narwhal	Narval
O	
Octopus	Pulpo
Orca	Orca
P	
Pectoral	Pectoral
Pelvic	Ventral, pélvico
Pinnipeds	Pinnípedos
“Wing-footed”	“Pie-aleta”
Plankton	Plankton
Pod	Manada
Porpoise	Marsopa
Predator	Animal predador, cazador
Prey	Presa
R	
Ratfish	Quimera
Rays	Rayas
S	
Scallop	Venera
School (of fish)	Banco de peces
Sea cucumber	Pepino de mar
Sea grass	Hierba de mar
Sea lemon	Limón de mar
Sea lettuce	Lechuga de mar
Sea lion	León marino
Sea otter	Lataz, nutria, lutra
Sea slug	Babosa de mar
Sea star (starfish)	Estrella de mar
Bat star	Estrella murciélago
Brittle star	Estrella delicada
Ochre star	Estrella ocre



Pink star	Estrella solar
Sea urchin	Erizo de mar
Purple urchin	Erizo morado
Red urchin	Erizo rojo
Seal	Foca
Seaweed	Alga marino
Shark	Escualo, tiburón
Thresher shark	Pez zorro
Tiger shark	Escualo tigre
Blue shark	Escualo azul
Great white shark	El gran blanco
Hammerhead	Pez martillo
Whale shark	Tiburón ballena
Shrimp	Gamba, camarón
Skate	Raya
Snail	Caracol
Spanish shawl	Bailarin español
Sponge	Esponja de mar
Squid	Calamar magano
T	
Toothed whale	Odontoceto
Tube feet	Pies en forma de tubo
Turkish towel seaweed	Alga toalla turca
V	
Vertebrate	Vertebrado
W	
Walrus	Morsa
Whale	Ballena
Humpback whale	Ballena nudosa (yubarta)
Bowhead whale	Ballena polar
Grey whale	Ballena gris
Killer whale	Orca
Pilot whale	Calderón



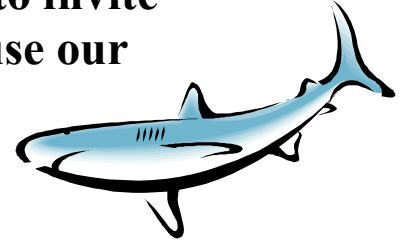
Sperm whale	Cachalote
Blue whale	Ballena azul
Beaked whale	Ballena de hocico de botella
Beluga whale	Beluga
Dall's porpoise	Marsopa de Dall
Bottlenose dolphin	Delfin mular
Worm	Gusano
Flat worm	Gusano liso
Ribbon worm	Gusano cinta



Educational Kits



The Aquarium would like to invite elementary school teachers to use our new loan kits!



What's inside?

Each kit contains videos, books, plush animal models, flashcards, prepared specimens or models of shells, teeth, or bones and information and activities developed by our education staff.

Is there a fee?

There is no fee for schools registered for outreach assemblies. The education staff will drop the kit off at your school when they come to give your program. You will be responsible for mailing or delivering the kit back to the Aquarium no later than two weeks after you receive your kit. Teachers from non-outreach schools may also acquire kits for a fee of \$35.00 and round-trip shipping. A refundable deposit of \$100 is required from both outreach and non-outreach schools.



What topics are offered?

- ◆ Sharks
- ◆ Whales
- ◆ Rocky Shore Invertebrates
- ◆ Seals, Sea Lions and Sea Otters

OREGON COAST
AQUARIUM



How do we get one?

Call the Aquarium at (541) 867-3474, ext. 5222 to request a kit. Completed kit applications must be received at least two weeks prior to requested arrival date. Visit our website to download an application:

<http://www.aquarium.org/edTeacherResources.asp?sid=4>



OREGON COAST AQUARIUM