

Table of Contents

Introduction.....	6
Acknowledgements.....	7
About this Curriculum... ..	8
Curriculum Themes	9

Before Visit to Campground

1. Seal Rock: Water, Water Everywhere?	11
Students perform a serial subtraction activity to visualize where water is found on Earth and as a way to recall the importance of water in sustaining life.	
2. It's Your Campground	25
Through an examination of progressively smaller scale maps, the focus continues on water as the link connecting the forest, shoreline, and adjacent marine habitats of Seal Rock Campground to each other, as well as to Hood Canal and Puget Sound.	
3. The Water Cycle	35
Students are introduced, or reintroduced to the water cycle, after which they write a poem or short story describing a water molecule's journey through the cycle and then create a water cycle model using assorted household or laboratory items.	
4. Dig It!	44
Students determine the age of an "artifact" in a sample of "strata" as they learn about the detective processes of geology, archaeology and paleontology.	
5. Shell Game	52
Through selected excerpts and guiding questions, a final report from an archaeological dig at Seal Rock serves as a vehicle for studying Native American interactions with the fauna and flora of Seal Rock.	
6. Watersheds	63
Students are faced with a challenge to design an effective watershed model, establish the boundaries of watersheds, then focus on activities within the Dosewallips watershed which can affect the habitat of salmon migrating past the nearby Seal Rock Campground.	
7. Connections	74
The concept of a food chain is explored through a guided reading, by diagramming food chains, and by playing an active role playing game which simulates an estuary food chain for salmon smolts.	
8. Times and Tides	92
Students use tide charts and graphs to understand Puget Sound tides, before actually observing their impact on Seal Rock beach.	

9. Links 102

Students build a model of a Seal Rock Campground food web using a set of cards which describe some important campground organisms and what they eat, then identify the trophic level of each organism in this food web.

During Campground Visit

10. Getting Familiar with Seal Beach Campground 113

A variety of activities are included to take your students from one end of the campground to the other and from its highest points to its lowest. Activities include:

Sign Language - using the beach interpretive signs as a guide, students become familiar with the site through activities which expand upon the topics covered in the following signs:

Rich with life in balance... - from each of the three ecosystems which comprise the Seal Rock Campground, students find a sign of life, then make a sketch or a rubbing of each of the signs.

If rocks could tell a story... - students find a glacier rounded rock and measure and record the distance from the sign to the rock, then locate plants and animals valued by Native Americans.

Hood Canal's special treasure - after locating an oyster or oyster shell with spat or a young oyster growing on it, students make a rubbing of the shell.

A circle of balance - using the data presented in the sign, students draw and label pictures of a salmon "circle of life" from egg to death after spawning

Life on the edge - students find and make a sketch of an animal "playing dead" on the beach, then find evidence that clams grow on Seal Rock beach.

Enjoy and explore Seal Rock Beach! - after listening to the sounds of the creatures on the beach, in the forest, and out on the open water, students write about what they've heard.

Cedar - A Gift from the Creator - following the Nature Trail, students read campground signage, do a rubbing, sketch the growth form of five cedar trees, and make hypotheses regarding how those five trees came to have the form they do.

Follow the Raindrop - students walk the campground site tracking and mapping the course they think a raindrop would follow from the upper campground to the waters of Hood Canal.

Checking it Out - first alone then with a partner, students walk the beach making observations of human activities which they record and analyze for their impact on the Seal Rock beach oyster population.

11. Can't See the Forest for the Trees 130

Students learn to identify the more abundant species as they complete two types of transects and hunt for the largest trees in the campground.

12. Looking More Closely 140

Students observe the variety of forest species by collecting data to construct a diversity index.

13. Which way is North? 151

To test a hypothesis based on the popular saying, "You can tell which way is north by looking at the moss growing on the tree trunks", students design and conduct an investigation.

14. Moving That Water Around 155

Students experimentally compare rates of transpiration to help them gain an understanding of the role of transpiration in forest ecosystems and in the larger water cycle.

15. Living in the Tidal Zone 163

Using tide tables, students determine whether the tide is ebbing or flooding, then they search for signs of intertidal zonation and sample the organisms in each tide zone.

16. Who's Living Here? 171

Students observe the variety of beach species and gather data to calculate a diversity index.

17. Fake 'em Out 185

Creation of an artificial tide allows students to observe how it affects intertidal animals.

18. Don't Tread on Me 190

Students compare the speed with which water can enter the soil in areas of low human activity to the speed with which water can enter the soil in areas of higher human activity.

19. Mini-spills 196

After locating signs of oil spillage in the campground parking lots students trace the flow of that oil into Hood Canal and add that information to their campground map.

20. Sounds Good to Me 200

In this final reflection on the day and on the sounds of Seal Rock Campground, students disperse to self-selected scenic spots for 5 or more minutes of listening followed by writing.

After Visit to Campground

21. Seeing the Forest and the Trees 203

Data collected during their visit to Seal Rock Campground is used to help give students a better picture of the forest.

Part I- What grows there?

Students pool data to determine tree frequencies at Seal Rock Campground and compare those frequencies with tree frequencies found on their particular site.

Part II - How many trees make a forest?

Pooling class data, gathered as teams from 4 m x 10 m study plots, students determine the number of each of the four most common trees found by the class, the average number for each of the trees per plot, and extrapolate from these averages to the number of each type of tree in the entire forested area of Seal Rock Campground.

Part III - Big Trees

Students compare the results of their searches for the biggest trees in Seal Rock Campground with the results of the American Forestry Association search.

22. Zoning Out210

To learn more about the intertidal beach at Seal Rock Campground, students use the data they collected on site.

Part I. - Tide's Out?

Students describe their solution to the tidal challenge..."How can a stake or relatively straight piece of driftwood tell you what the tide is doing?"

Part II, A - Where's that line?

After comparing their measurements of zone widths with those of others in their class, students consider possible sources of the differences observed.

Part II, B - Who lives here?

Students calculate sample averages and class averages for the number of organisms per 50 cm² in each tidal zone, then use the averages to answer a variety of questions.

23. Well, Who Is Living Here?218

Students use the data they collected Seal Rock beach to calculate a species diversity index.

24. Drop by Drop223

After comparing their findings at Seal Rock Campground with results from percolation tests they conduct on the school site, students examine the role of texture in percolation.

25. Who me? 234

Vehicle use in their school community is examined as students conduct a series of surveys.

26. Puget Sound Game243

Students play a simulation game in which they are asked to assume roles that represent a variety of individuals who use Puget Sound and its tributaries.

Appendix258

Seal Rock Campground Location Map259

Glossary262

WA State Essential Academic Learning Requirements in Science265

Field Trip Etiquette266

Resources267

Plant ID Cards272

Animal ID Cards275

Introduction

The forest, intertidal beach and salt water all come together at Seal Rock Campground. From a shaded forest with moss covered trees, to a sunny path edged with wildflowers, to a beach with dense natural oyster beds covering boulders, to a sweeping view of the deep blue waters of Hood Canal, the 30 acres of Seal Rock Campground are rich with educational opportunities.

The distinct but interdependent ecosystems of Seal Rock Campground achieve a natural dynamic balance. Fresh water rivers pouring in from the forested mountains and the salty tides pushing in from the ocean and Puget Sound create the unique Hood Canal estuary which gives life to a wide diversity of species adapted to this area. The forest, too, supports a complex assortment of terrestrial plants, birds, mammals, amphibians and invertebrates. Where the forest meets the sea, an intertidal ecosystem with its assemblage of plants and animals also struggles to live in balance. Together, these interlocking ecosystems provide essential food, water, shelter and space to thousands of species inhabiting this area.

The Seal Rock Marine Trail Curriculum, Grades 9 - 12 provides an opportunity for students to explore and understand how the dynamic balance is affected by natural and human-caused events. Students investigate the movement of material and energy within and between Seal Rock Campground ecosystems, build models of the campground food web, explore the campground from one end to the other and from its highest to its lowest points, gather and analyze data reflecting forest and intertidal diversity, and look at past and human interactions with the environment. Finally, they integrate all they have studied through an engaging simulation game in which they are asked to assume roles that represent a variety of individuals who use the area.

For thousands of years Native Americans lived in the Seal Rock Campground area, deriving a rich existence from these ecosystems while recognizing that they were also a part of those systems. In many ways we have lost sight of the fact that we are a part of the global ecosystem rather than apart from it. Like it or not, today people play an important role in maintaining the healthy balance of these ecosystems. It is only through an understanding and appreciation of the natural world that we can hope to move past a concern for the immediate future to a sense of where we as a species fit in the immensity of biological and geological time.

It is our hope that this curriculum will help teachers and students gain the understanding needed to become active stewards of Seal Rock Campground, its environs, and our greater environment as well.