

Camp Ocean Pines – Outdoor Ed Curriculum

Summary w/ 5th-6th Grade Standards Correlations

Estuary Introduction- White's Point

Objective: Introduction to estuary ecology and bird's eye view of its major components.

Vocabulary: Estuary; Watershed; Dune; Inlet

Standards Correlations - Fifth Grade: *Earth Sciences: 3.a & 3.e* *Water on Earth:* Students will learn why estuaries are such important habitats because they include both fresh and salt water. When people use resources such as fresh water, they can have a major impact on areas like estuaries that are dependent on fresh water input. **5.b.** *The solar system* Students will learn the effects of tide on the estuary, which are correlated with the gravitational forces of the Moon and Sun.

Standards Correlations - Sixth Grade: *Shaping the Earth's Surface: 2.b & 2.c* *Topography, Rivers and streams; Beaches:* Students will learn the role of rivers and fresh water input in estuary dynamics. Students will be able to observe how rivers and an estuary system reshape the coast. *Ecology (Life Science) 5.e. Organisms in ecosystems - The number and types of organisms an ecosystem can support depends on the resources available and on abiotic factors:* Estuaries support large populations and biodiversity of organisms because they offer a habitat with mixed natural resources.

Kayaking (Morro Bay)

Objective: Students will learn and use basic kayaking skills, and have close-up views of all of the estuary's components.

Lessons and Activities: Eel grass; Bird Sanctuary (herons, egrets, turkey vultures, pelicans, and cormorants); Shell Cove - discarded shells from shell fishing (not Native American); Seal Haul-Out – seals and sea otters; White Pelicans - hunt cooperatively and are often found in freshwater; Dunes - How vegetation affects dune stability; observe a protected Chumash midden and nesting snowy plovers.

Geology- Morro Rock, Sand Dunes

Objective: Students will learn the geology of Morro Rock and observe sand dunes while learning about their formation and function along a coastline.

Vocabulary: Igneous; Sedimentary; Metamorphic; Obducted; Subducted; Magma; Lava

Standards Correlations - Fifth Grade: *Physical Sciences – 1.f.* Differences in chemical and physical properties of substances are used to separate mixtures and identify compounds. *Investigation and Experimentation - 6.a. Classify objects in accordance with appropriate criteria-* Students will learn how rocks are classified and the distinguishing characteristics of local rocks.

Standards Correlations - Sixth Grade: *Focus on Earth Science Plate Tectonics and Earth's Structure: 1.c. Lithospheric plates the size of continents and oceans move at rates of centimeters per year in response to movements in the mantle-* Many local rocks are formed as a result of plate subduction. **1.e.** *Major geologic events, such as earthquakes, volcanic eruptions, and mountain building, result from plate motions-* Students will learn how Morro Rock was formed by volcanic activity due to plate motions. **1.f.** *Students know how to explain major features of California geology in terms of plate tectonics-* Students will review the origin of volcanoes and how their locations are influenced by plate motions. **Shaping**

the Earth's Surface - 2.c. Beaches are dynamic systems in which the sand is supplied and moved along the coast by the action of waves- Sand dunes are dynamic beach features dependent on sand supplied by wave action. 2.d. Earthquakes, volcanic eruptions, landslides, and floods change human and wildlife habitats- Morro Rock's formation created nesting habitat for the peregrine falcon.

Mud Flats

Objective: Students will learn about mud flat ecology and search for organisms that inhabit them.

Vocabulary: Habitat; Community; Ecosystem; Detritus; Mudflat; Decomposer; Detritivore

Standards Correlations - Fifth Grade: Life Sciences 2. *Plants and animals have structures for respiration, digestion, waste disposal, and transport of materials. 2.a. Many multicellular organisms have specialized structures to support the transport of materials-* Students will have the opportunity to investigate mud flat organisms and learn how their structures help them adapt to their environment.

Standards Correlations - Sixth Grade: Ecology Life Sciences – 5.b. *Organisms in ecosystems exchange energy and nutrients among themselves and with the environment. Matter is transferred over time from one organism to others in the food web and between organisms and the physical environment-* Students will be able to view the mudflats as an important habitat for organisms and a critical component of nutrient cycling in the estuary. **5.c.** *Populations of organisms can be categorized by the functions they serve in an ecosystem-* Mudflats are an important habitat for populations of detritivores, which consume and recycle decaying plant and animal matter.

Plants of the Estuary

Objective: To introduce students to plant adaptations and the roles they play in the marine environment.

Vocabulary: Halophyte; Accumulator; Excretor; Primary Producer; Autotroph; Heterotroph

Standards Correlations - Fifth Grade: Life Sciences-*Plants and animals have structures for respiration, digestion, waste disposal, and transport of materials. 2a. Many multicellular organisms have specialized structures to support the transport of materials-* Students will learn how plants are able to grow and thrive in saltwater environments. **2f.** *Plants use carbon dioxide and energy from sunlight to build molecules of sugar and release oxygen* **Investigation and Experimentation: 6.a.** *Classify objects in accordance with appropriate criteria-* Plants can be classified in many ways including what habitats they grow in.

Standards Correlations - Sixth Grade: Ecology (Life Science) *Organisms in ecosystems exchange energy and nutrients among themselves and with the environment. 5a. Energy entering ecosystems as sunlight is transferred by producers into chemical energy through photosynthesis and then from organism to organism through food webs-* Plants are producers that use the sun's energy to make food and then pass on this resource to consumers. **5b.** *Matter is transferred over time from one organism to others in the food web and between organisms and the physical environment-* Students will learn how plants support the basis of the food web. **5e.** *The number and types of organisms an ecosystem can support depends on the resources available and on abiotic factors-* Plant populations are dependent on natural resources and abiotic factors such as light which in turn, affects the number of other organisms in an ecosystem.

Tide Pool Discovery and Exploration

Objective: To encourage students to use an observational approach to explore and investigate tide pool biology

Vocabulary: Intertidal zone; Sleeper Wave

Standards Correlations - Fifth Grade: Life Sciences 2. *Plants and animals have structures for respiration, digestion, waste disposal, and transport of materials. 2a.* Many multicellular organisms have specialized structures to support the transport of materials- Students will investigate specialized structures of tide pool organisms. **2c.** *The sequential steps of digestion-* Students will investigate the anatomies of tide pool organisms and how they pertain to eating, digesting, and then eliminating waste. **Investigation and Experimentation 6.a.** *Classify objects (e.g., rocks, plants, leaves) in accordance with appropriate criteria-* Students will observe, identify, and learn about classification of intertidal organisms.

Standards Correlations - Sixth Grade: Ecology (Life Science) 5.b. *Matter is transferred over time from one organism to others in the food web and between organisms and the physical environment-* Students will observe tidepool organisms interacting and competing in their environment in respect to the marine food web. **5.c.** *Populations of organisms can be categorized by the functions they serve in an ecosystem-* Students will learn predator prey relationships in the tide pool and how prey limits the predator population. **5.d.** *Different kinds of organisms may play similar ecological roles in similar biomes-* Students will observe a diversity of species competing for the same resources such as grazing gastropods competing for algae. **5.e.** *Numbers and types of organisms in an ecosystem depend on resources available and abiotic factors-* Students will be able to observe how the diversity of tide pool life differs depending on the tide pool's location. This is due to changes in the availability of resources and abiotic factors available to the tide pool resulting from varied exposure to light, predators, and tidal flushing.

Marine Algae/ Kelp

Objective: Students will learn the importance of algae in the marine environment and identifying characteristics with an emphasis on the kelp communities of the California Coast.

Vocabulary: Algae; Blade; Holdfast; Stipe; Pneumatocyst; Vascular; Non-vascular; Primary Producer; Photosynthesis; Sessile; Benthic; Macroscopic

Standards Correlations - Fifth Grade: Life Sciences 2. *Plants and animals have structures for respiration, digestion, waste disposal, and transport of materials. 2a.* Many multicellular organisms have specialized structures to support the transport of materials- Students will learn how algae are able to grow and thrive in aquatic environments. **Investigation and Experimentation 6.a.** *Classify objects in accordance with appropriate criteria-* Students will learn ways in which algae are classified such as by size and color.

Standards Correlations - Sixth Grade: Ecology (Life Science) 5. *Organisms in ecosystems exchange energy and nutrients among themselves and with the environment. 5.a.* Energy entering ecosystems as sunlight is transferred by producers into chemical energy through photosynthesis and then from organism to organism through food webs- algae are producers that use the sun's energy to make food and then pass on this resource to consumers. **5.b.** *Matter is transferred over time from one organism to others in the food web and between organisms and the physical environment-* Students will learn how algae support the base of the marine food web. **Resources 6.b.** *Classify different natural energy and material resources as renewable and nonrenewable -* Students will learn the importance of algae as a renewable resource in the world's oceans. **6.c.** *The natural origin of the materials used to make common objects-* algae and its derivatives are widely used by humans as a food and as ingredients in many common products.

Resource Materials: Monterey Bay NMS: p.104 –118 (rocky shore, algae); 141 –153 (kelp forests); *Good Algae ID Link:* <http://www.sonoma.edu/biology/algae/algae.html>; The Seaside Naturalist p. 25-35

Waves and Currents

Objective: Students will learn how waves and currents form and how they influence the California coast.

Vocabulary: Wave; Crest; Trough; Height; Period; Wavelength; Current; Tsunami; Fetch

Standards Correlations - Fifth Grade: Physical Sciences 1.g. *Properties of substances* – The world’s oceans are made up of salt water, which can be influenced by Earth’s physical forces. **Earth Sciences 3.a.** *Most of Earth’s water is present as salt water in the oceans, which cover most of Earth’s surface* **4.b.** *Influence of the ocean on weather-* The California current and other currents are an important influence on local weather (fog, moderate climate). It has a cooling influence during the summer and fall and a warming influence during the winter and spring.

Standards Correlations - Sixth Grade: Focus on Earth Science, Plate Tectonics and Earth’s Structure 1.e. *Plate motions cause major geologic events-* Tsunamis can be caused by earthquakes and landslides resulting from plate movements. **Shaping Earth’s Surface 2c.** *Beaches are dynamic systems in which the sand is supplied by rivers and moved along the coast by the action of waves* **Heat (Thermal Energy) (Physical Science) 3.a.** *Energy can be carried from one place to another-* Water currents are a medium through which heat energy can be carried from one part of the ocean to another. **Energy in the Earth System 4.a.** *The sun is the major source of energy for phenomena on Earth’s surface; it powers winds, ocean currents, and the water cycle*

Pier Piling Biology

Objective: Students will learn and observe a positive effect of human activity on the marine environment.

Vocabulary: Pier; Piling

Standards Correlations - Fifth Grade: Life Sciences 2. *Plants and animals have structures for respiration, digestion, waste disposal, and transport of materials.* **2.a.** *Many multicellular organisms have specialized structures to support the transport of materials-* Students will be given the opportunity to investigate specialized structures of pier piling organisms. **Investigation and Experimentation 6.a.** *Classify objects (e.g., rocks, plants, leaves) in accordance with appropriate criteria-* Students will review how scientists classify organisms and observe features that help them in the process of taxonomy.

Standards Correlations - Sixth Grade: Ecology (Life Science) 5.b. *Matter is transferred over time from one organism to others in the food web and between organisms and the physical environment-* Students will observe pier piling organisms interacting and competing in their environment. **5.c.** *Populations of organisms can be categorized by the functions they serve in an ecosystem-* Students will learn predator prey relationships on the pilings and how prey limits the predator population. **5.e.** *Numbers and types of organisms in an ecosystem depend on resources available and abiotic factors-* Organisms on pilings are restricted in population by available surface area receiving water coverage at some point in the tidal cycle.

Beach Wrack and Zonation

Objective: Students will learn about habitats and communities in a sandy beach ecosystem and sandy beach zonation.

Vocabulary: Beach Wrack; Zonation; Habitat; Berm

Resources: MBNMS Life at the Beach p. 83 – 93

Standards Correlations - Fifth Grade: Life Sciences 2. *Plants and animals have structures for respiration, digestion, waste disposal, and transport of materials.* **2.a.** *Many multicellular organisms have specialized structures to support the transport of materials-* Students will be given the opportunity to investigate specialized structures mole crabs and beach

hoppers and how they help them obtain food. **6.g.** *Plant and animal cells break down sugar to obtain energy in the process of respiration*-Students will learn what different organisms eat to give them the energy they require.

Standards Correlations - Sixth Grade: *Shaping Earth's Surface 2.c.* *Beaches are dynamic systems in which the sand is supplied by rivers and moved along the coast by the action of waves*- Students will observe how wave action influences the beach and wrack line as well as organisms that need utilize sand as a habitat. **Ecology (Life Science) 5.b.** *Matter is transferred over time from one organism to others in the food web and between organisms and the physical environment*- Students will learn how sandy beach organisms utilize living and decaying marine food resources to fill their respective niches in the marine food web. **5.e.** *Numbers and types of organisms in an ecosystem depend on resources available and abiotic factors*- Populations of beach hoppers are directly related to the availability of food sources on the beach.

Sand- dune Ecology, Particle Size and Origin

Objective: Students will learn the characteristics and features of a sandy beach ecosystem.

Vocabulary: Erosion; Coast; Biogenic

Resources: <http://www.seafriends.org.nz/oceano/beach.htm>; MontereyBay NMS Beaches and Dunes p79-82

Standards Correlations - Fifth Grade: *Investigation and Experimentation 6.a.* *Classify objects in accordance with appropriate criteria*- Students will learn how sand particles are classified and how particle size affects dune and beach formation.

Standards Correlations - Sixth Grade: *Focus on Earth Science (Shaping the Earth's Surface) 2.c.* *Beaches are dynamic systems in which the sand is supplied by rivers and moved along the coast by the action of waves*- Sand particle size and origin is influenced by the abundance of rivers along the California coast as well as coastal exposure to heavy wave action.

Hike to San Simeon Point

Objective: Students will be able to observe interactions between forest and marine ecosystems as well as the impact of invasive species on an ecosystem.

Vocabulary: Native species; Non-native species; Invasive; Ecosystem

Marine Mammals

Objective: To introduce the characteristics and adaptations of marine mammals common in California waters.

Mammals Studied: Northern Elephant Seals (*Mirounga angustirostris*); Southern or California Sea Otters (*Enhydra lutris*); California Sea Lion (*Zalophus californianus*); Harbor Seals (*Phoca vitulina*); Whales

Vocabulary: Mammal; Adaptation; Fluke; Dorsal Fin; Pectoral Fins; Cetacean; Pinniped; Molt; Catastrophic Molt; Threatened; Metabolism; Rafting; Blubber; Fluke; Blow/Spout; Baleen; Echolocation; Melon

Standards Correlations - Fifth Grade: *Life Sciences 2.* *Plants and animals have structures for respiration, digestion, waste disposal, and transport of materials. 2.a.* *Many multicellular organisms have specialized structures to support the transport of materials*- Students will learn specialized structures of local marine mammals and how they enable them to survive in their environment. **2.b.** *Circulation of blood*- Students will learn about blood and oxygen circulation in marine mammals and how it is a critical component of their survival in the marine environment by allowing them to dive and stay warm in cold water. **2.c.** *The sequential steps of digestion*- Students will learn how the anatomies of marine mammals enable them to capture and digest their preferred food items. **Investigation and Experimentation 6.a.** *Classify objects (e.g., rocks, plants, leaves) in accordance with appropriate criteria*- Students will learn why marine animals are classified into different groups. **United States History**

and Geography: Making a New Nation 5.3 Cooperation and conflict between the Indian nations and the new settlers. **5.3.2** Cooperation between the colonists and the Indians during the 1600's and the 1700's- Students will learn how actions of early fur traders decimated local sea otter populations and threatened the ecological balance in the kelp beds.

Standards Correlations - Sixth Grade: Ecology (Life Science) 1. Organisms in ecosystems exchange energy and nutrients among themselves and with the environment. **1.b.** Matter is transferred over time from one organism to others in the food web- Students will learn the roles of local marine mammals in the marine food web.

Sharks/Fish

Objective: Students will learn basic shark and other fish biology.

Vocabulary: Chondrichthyes; Osteichthyes

Resource: http://www.njmssc.org/Education/Lesson%20Plans/Build_A_Fish.htm

Standards Correlations - Fifth Grade: Life Sciences 2. Plants and animals have structures for respiration, digestion, waste disposal, and transport of materials. **2.a.** Many multicellular organisms have specialized structures to support the transport of materials- Students will learn specialized structures of fish and sharks such as how different types of teeth enable them to crush and tear food. **2.b.** Circulation of blood- Students will learn about circulation in fish and sharks. Oxygen is taken in by the gills and pumped throughout the body by the heart. **2.c.** The sequential steps of digestion- Students will learn internal anatomy of a fish and sharks and learn how the functions of major organs pertain to digestion.

Standards Correlations - Sixth Grade: Ecology (Life Science) 2. Organisms in ecosystems exchange energy and nutrients among themselves and with the environment. **2b.** Matter is transferred over time from one organism to others in the food web- Students will learn the role of fish and sharks in the marine food web.

Squid Dissection

Objective: Students will learn basic squid anatomy and proper dissection technique.

Vocabulary: Mantle; Mollusc; Cephalopod; Chromatophores

Standards Correlations - Fifth Grade: Life Sciences 2. Plants and animals have structures for respiration, digestion, waste disposal, and transport of materials. **2.a.** Many multicellular organisms have specialized structures to support the transport of materials- Students will learn specialized structures of the squid such as the beak and how it enables the squid to crush and tear food. **2.b.** Circulation of blood- Students will learn about circulation in the squid. Oxygen is taken in by the gills and pumped throughout the body by the squid's three hearts. **2.c.** The sequential steps of digestion- Students will observe the internal anatomy of the squid and learn how the functions of the major organs pertain to digestion.

Standards Correlations - Sixth Grade: Ecology (Life Science) 2. Organisms in ecosystems exchange energy and nutrients among themselves and with the environment. **2.b.** Matter is transferred over time from one organism to others in the food web- Students will learn the role of squid in the marine food web.

Native Uses- abalone necklaces

Objective: Students will learn about Chumash culture and their utilization of local marine resources.

Vocabulary: Abalone; Chumash

Standards Correlations - Fifth Grade: United States History and Geography: Making a New Nation 5.1 Pre-Columbian settlements **5.1.1** How geography and climate influenced the way various nations lived and adjusted to the

natural environment and how they obtained food, clothing, tools, and utensils- Students will learn about the Chumash Indians that inhabited the local coastal area and how they used crude tools in their culture. **5.1.2** *Describe their varied customs and folklore traditions-* By using the hand drills to make necklaces, students are practicing and learning a Chumash traditional craft. **5.3** *Cooperation and conflict between the Indian nations and the new settlers* **5.3.2** *Cooperation between the colonists and the Indians during the 1600's and the 1700's-* Students will review how Chumash culture was altered when settlers arrived on the west coast. **5.3.4** *Factor's that lead to the Indians' defeat-* Students will review the downfall of the Chumash and local Indian cultures.

Standards Correlations - Sixth Grade: World History and Geography: Ancient Civilizations 6.1.1. *Describe the hunter-gather societies, including the development of tools and the use of fire-* Students will learn how the Chumash Indians developed some of their tools and how they were able to create fire. **6.1.2.** *Describe how humans adapted to a variety of environments-* Students will learn how the Chumash adapted to the environment of coastal California.

Tidepool Monitoring and Etiquette

Objective: The primary objective of this lesson is to familiarize students with the basic monitoring practices that ecologists use to monitor the health of a rocky intertidal zone (tidepool). Students will also learn how to observe intertidal organisms with as little human impact as possible.

Vocabulary: Intertidal zone; Biota; Correlation

Standards Correlations - Fifth Grade: Investigation and Experimentation 6.a. *Classify objects (e.g., rocks, plants, leaves) in accordance with appropriate criteria-* Students will be asked to classify many different plants, animals, and solid structures. **6.f.** *Select appropriate tools for quantitative observations-* the quadrats are a tool by which organism abundance can be measured quantitatively. **6.g.** *Record data by using appropriate graphic representations (including charts, graphs, and labeled diagrams) and make inferences based on those data-* The student will be asked to chart and perhaps graph and even sketch the data they find. **Earth Sciences 3.a.** *Most of Earth's water is present as salt water in the oceans, which cover most of Earth's surface-* The students will be taught the importance of protecting this abundant resource. **3.c.** *Water vapor in the air moves from one place to another-* Students will learn that this is a way in which contaminants can travel from one place to the next. **4.c.** *Causes and effects of different types of severe weather-* Students will learn the effects of severe weather on the intertidal zone.

Standards Correlations - Sixth Grade: Statistics, Data analysis, and Probability - *Identify different ways of selecting a sample-* Students will sample their chosen areas using a quadrat and recording their data. *Identify data that represent sampling errors and explain why the sample might be biased-* Students will be given a chance to analyze their data and compare it with other groups. **Ecology (Life Sciences) 5.d.** *Different kinds of organisms may play similar ecological roles in similar biomes-* Students will be able to observe organisms that compete for the same resources within their sampling areas.

Tides

Objective: To explain what causes the tides and to teach students to read, graph, and visualize a tide chart.

Vocabulary: Full Moon; New Moon; Neap Tide; Spring Tide; Gravity

Standards Correlations - Fifth Grade: Algebra and Functions *Use information taken from a graph or equation to answer questions about a problem situation-* Students will graph tide data and then use their graph to visualize and determine high and low tides. **Statistics, Data Analysis, and Probability:** *Organize and display single-variable data in appropriate graphs and*

representations- Students will graph tide data to visualize changes between high and low tides. *Know how to write ordered pairs correctly-* Students will plot water level on the y-axis and time on the x-axis. **Physical Sciences 1.g.** *Students know the properties of solid, liquid, and gaseous substances-* Students will learn why water responds so strongly to the gravitational forces of the moon and sun while the earth's crust does not. **Earth Sciences 3.a.** *Most of Earth's water is present as salt water in the oceans, which cover most of Earth's surface-* Tides have the strongest effect on the Earth's oceans. **5.b.** *The solar system includes the planet Earth, the Moon, and the Sun-* Tides are caused by the Earth's proximity to large objects in the solar system. **5.c.** *The path of a planet around the Sun is due to the gravitational attraction between the Sun and the Planet-* Gravitational attractions between the Sun, moon, and Earth form the basis for understanding what causes oceanic tides. **Number Sense: 1.1** *Compare and order positive and negative fractions, decimals, and mixed numbers and place them on a number line-* Students will deal with positive and negative tidal differences and order them for graphing the tides.

Tide Pool Natural History- touch tank

Objective: Students will be able to observe and handle living and preserved local marine organisms while learning about some of their lifestyles and defining characteristics.

Vocabulary: Taxonomy; Desiccation

Standards Correlations - Fifth Grade: Life Sciences 2. *Plants and animals have structures for respiration, digestion, waste disposal, and transport of materials. 2.a.* *Many multicellular organisms have specialized structures to support the transport of materials-* Students will be given the opportunity to investigate specialized structures of tide pool organisms. **2.c.** *The sequential steps of digestion-* Students will be able to investigate the anatomies of tide pool organisms and how they pertain to eating, digesting, and then eliminating waste. **6.g.** *Plant and animal cells break down sugar to obtain energy in the process of respiration-* Students will learn what different organisms eat to give them the energy they need for respiration. *Investigation and Experimentation 6.a.* *Classify objects (e.g., rocks, plants, leaves) in accordance with appropriate criteria-* Students will learn how scientists classify organisms and observe features that help them in the process of taxonomy.

Standards Correlations - Sixth Grade: Ecology (Life Science) 5.b. *Matter is transferred over time from one organism to others in the food web and between organisms and the physical environment-* Students will learn how tidepool organisms interact and compete in their environment in respect to the marine food web. **5.c.** *Populations of organisms can be categorized by the functions they serve in an ecosystem-* Students will learn predator prey relationships in the tide pool and how prey limits the predator population. **5.d.** *Different kinds of organisms may play similar ecological roles in similar biomes-* Students will learn that tide pools support a diversity of species that compete for the same resources such as grazing gastropods competing for algae. **5.e.** *Numbers and types of organisms in an ecosystem depend on resources available and abiotic factors-* In learning the natural history of tide pool organisms, students will also learn what requirements the organisms have and how that limits their populations.