LAKESIDE FARMS ELEMENTARY PRESENTS

LIFE ON THE EDGE

WE ARE HEROES FOR THE TIDEPools AND YOU CAN BE TOO!

EDUCATOR EDITION with classroom resources at the back!
WILDCOAST, founded in 2000, is an international non-profit organization that conserves coastal and marine ecosystems and addresses climate change through natural solutions. Through the establishment and management of protected areas, the advancement of conservation policy, and the direct engagement of local communities in stewardship projects, WILDCOAST is conserving more than 31.6 million acres of some of the most ecologically important coastline, wetlands, islands, and marine wilderness in California and Mexico.

WILDCOAST partnered with the incredible student scientists at Lakeside Farms Elementary School to collect data, educate the public, and conserve our local tidepools.

A special thanks to Points of Light KPMG Youth Grants for funding this work.

FOR MORE RESOURCES VISIT WILDCOAST.ORG
Tide pools are puddles of water home to many small creatures, left by the lowering tides.
Tide pools are pools of water in between rocks with critters in the water such as crabs and small fish.
Tide pools are pools of water left behind in the rocks during low tide.
Tidepools are home to a lot of amazing creatures!
My favorite tidepool animal is an octopus.
MY FAVORITE POOL CRITTER IS A CALIFORNIA SEA HARE
My favorite tidepool critter is the sea urchin, but my real favorite sea critter is the Jellyfish. I love the Jellyfish because it is very colorful and pretty.
my favorite animal is a crab

Giselle 5th Grade
My favorite Tidepool critter is a SEA STAR.
Tide pools are home to a lot of amazing creatures! My favorite tide pool critter is a Stripped Shore crab!
For protection, my favorite sea animal is a sea urchin. Because they have spines, they are not easy to catch.
My favorite tide pool critter is among them 😊.
Tide pools are threatened by human and climate change.

Fun fact about starfish: if one of their legs or arms get cut off, it can regrow.
Tidepools are being threatened by humans when they take the sea creatures out of their habitat.
Tidepools are threatened by humans by stepping on rocks and sea critters.
Tidepools are threatened by humans because we are touching and hurting the tidepools.
Tide pools need to be protected because there are many creatures that depend on the habitat they live in.
Tide pools are important to me because they are home to many different types of sea creatures.
Tidepools are important to me because everything is so beautiful.
Tidepools are important to me because they are so amazing to look at.
Tide pools need to be protected because they are the homes of many creatures.
TIDE POOLS ARE AMAZING TO LOOK AT AND OBSERVE.
We can protect the tide pools by not flipping over rocks.
I am a hero when I leave all the creatures in the tide pool.
I am a hero for tidepools when I teach others how to care for the tidepools.
The intertidal zone, the unique area between the high and low tide lines, is a harsh and unforgiving habitat. The highly conditioned species that live there are subject to the rigors of both the land and the sea, going from completely submerged to only occasionally wet within just a few feet of space. Organisms that inhabit the intertidal zone must endure extreme fluctuations in moisture level, temperature, salinity, and sunlight creating a robust assortment of biologically diverse organisms. These fascinating creatures boast an even more fascinating set of adaptations, creating an adventure for anyone who visits this space between the land and the sea.
Many organisms have adapted to the constant battering of waves by permanently affixing themselves to the rocks, while other mobile creatures get “stuck” in pools of water during the low tide. This, combined with the close proximity of organisms in the intertidal, creates an abundance of food.

Photosynthesizers, such as brown algae and plants, are typically abundant in the intertidal and can help support an entire food chain.

Wave action supplies a constant influx of oxygen and nutrients.

Varied substrate provides good places to cling to and ample places to hide.

However, there are also many challenges of living in the rocky intertidal:

- Intertidal organisms must deal with both marine predators during high tide and terrestrial predators during low tide.
- Wave action can carry unprotected animals out to sea.
- The changing water level leads to variances in salinity (the saltiness of the water).
- The intertidal is marked by plentiful sunlight, which may lead to desiccation (drying out) and increased water temperatures.
- Space is often extremely limited, forcing organisms to compete for substrate.

In order to survive in this harsh environment intertidal organisms have evolved a wide array of specialized adaptations.
Adaptations

To deal with the wide variety of challenges in the rocky intertidal, organisms developed an even wider array of adaptations:

**THREAT**: Constant pounding of waves

**ADAPTATIONS**: Some animals such as echinoderms (sea stars, urchins) cling fast to rocky substrates. Other organisms such as crabs find shelter inside of crevices or thick mats of kelp.

**THREAT**: Desiccation

**ADAPTATIONS**: Some bivalves, like clams, clamp down their shells to limit water loss. Some mollusks, such as marine snails, slow down evaporation rates with hard outer layers. Some crustaceans, like barnacles, cluster together to reduce individual exposure.

**THREAT**: Predation from terrestrial species (birds and mammals)

**ADAPTATIONS**: In addition to fastening to substrate and closing their protective shells, organisms tend to gravitate towards the lower intertidal zones, towards deeper water and abundant hiding places, that is, for safety.
The intertidal zone is the strip of land that exists between the high and low tide lines. During high tide this area may be completely submerged while low tide sees moisture only from the random wave.

Unique within this habitat is the “rocky intertidal,” intertidal areas filled with rocks. When the tide goes out small pools of water are left behind in the rocks, creating a haven for those intertidal creatures looking for more moisture. These “tidepools” boast a distinctive assortment of creatures that lend themselves well to lessons focused on adaptations and biodiversity.

Tidepool Etiquette

- **Watch where you step**, that might not be a rock!
- **Leave things how you found them**. If you turn over a rock put it back exactly how you found it.
- **Take only pictures**. Leave all rocks, plants, animals, and other tidepool creatures exactly how you found them.
- **Leave animals be**. Tidepool organisms have a hard enough life as it is without being touched by a bunch of sticky fingers.
- **Be careful where you put your fingers**. Many animals like sea urchins and crabs have defenses against predators.
- **Never turn your back on the ocean**... it needs you too much! But seriously, watch out for waves and the incoming tide.
Marine Protected Areas (MPAs)

California’s coastal and marine ecosystems are some of the most iconic and treasured resources in the state and contribute greatly to the history, identity, and economy of the area. Unfortunately, these same ecosystems are also some of the most exploited and without proper care the long-term health of these resources is in jeopardy. Recognizing the need to safeguard California’s coastal and marine ecosystems, the state legislature passed the Marine Life Protection Act in 1999. This act aimed to protect California’s precious marine resources by creating a statewide network of marine protected areas (MPAs). Designed to protect the diversity and abundance of marine life while still maintaining recreational access for people, MPAs now protect over sixteen percent, or 850 miles, of the California coast.

Just as state parks protect resources on land, MPAs protect resources in the ocean by managing human activities within biologically important areas. The Marine Life Protection Act recognizes that a combination of MPAs with varied amounts of allowed activities and protections (marine reserves, marine conservation areas, and marine parks) can help conserve biological diversity, provide a sanctuary for marine life, and enhance recreational and educational opportunities.

There are 11 MPAs in San Diego County that fall under three categories:

- **Take, damage, injury, or possession of any marine resource (living, geological, or cultural) is prohibited. Recreational activities are encouraged.**
  - Matlahuayl South La Jolla Cabrillo

- **Take, damage, injury, or possession of any natural resource (living, geological, or cultural) is prohibited.**
  - Batiquitos Lagoon San Elijo Lagoon Famosa Slough

- **Take, including fishing/harvest of some marine resources is permitted. Some consumptive recreational and commercial activities are allowed at specific locations.**
  - Swami’s San Dieguito Lagoon San Diego-Scripps Coastal South La Jolla Tijuana River Mouth

Key Words

**Marine Protected Area (MPA):** MPAs are areas in or near the ocean made to protect or conserve marine life and habitat, safeguard cultural sites, and provide enhanced recreational opportunities.

**Natural Resource:** Materials or substances such as minerals, forests, water, or animals that are found in nature and are valuable to humans.

**Take:** To hunt, pursue, catch, capture, or kill, or attempt to hunt, pursue, catch, capture, or kill.
Tidepool in a Pan

Lesson adapted from Buggy and Buddy
All photos from:
https://buggyandbuddy.com/tide-pool-science-experiment-kids/

Materials
Dish pan or paint tray
Lots of rocks and stones in various sizes
Mini toy sea creatures
Water

Directions
1. Fill your dish pan with rocks and stones. Make sure to arrange them so there are varying levels of rocks in your pan, resembling the levels of a tidepool.

2. Place your mini animals in the tide pool model.

3. Before adding water, discuss which animals will be underwater first as water is added.

4. Begin to add water one pitcher or cup at a time. (Pay attention to which animals are covered with water first.)

5. Continue adding water until you reach high tide. Notice how all the animals are underwater during high tide.

6. Before dropping your water level to low tide, discuss which animals will be exposed to the air first. Begin removing water one pitcher at a time until you’ve reached low tide. Notice how at low tide most animals are exposed to air. (This is a great time to talk about any body parts or movements sea creatures have to help them with low tide!)
TIDEPOOLS ARE DIVERSE AND IMPORTANT COASTAL ECOSYSTEMS. THEY PROVIDE SHELTER AND FOOD FOR SOME OF THE MOST AMAZING CREATURES WITH DIVERSE ADAPTATIONS SUCH AS SEA ANEMONES, SEA STARS, BARNACLES, CRABS, SHOREBIRDS, AND EVEN OCTOPUS AND LOBSTER.

WILDCOAST AND THE STUDENTS AT LAKESIDE FARMS ELEMENTARY ARE WORKING TO SAVE TIDEPOOLS AND YOU CAN HELP!