

Intertidal Transect: Beach**Teacher's Guide**

Subject: Integrated Science (Life; Earth-Space; Physical)

Topic: Abiotic Factors; Biotic Factors; Intertidal Zone; Transects; Adaptations

Summary: To study and observe the relationship between differences in abiotic and biotic factors, and how abiotic factors influence marine organisms.

After completing the field lab, students will be able to:

Objective(s):

1. List at least four different abiotic factors that influence marine communities.
2. Explain how differences in abiotic factors can create microhabitats often in very close proximity to one another.
3. Conduct sampling using a transect and quadrat.
4. Explain the origins of the intertidal zone and the unique habitat it creates as well as some of the adaptations that allow certain animals to survive.

Ecosystem(s): Beaches/Dunes

Equipment:

- Tape measure
- Multi-meter (wind; light; temperature; RH)
- Soil thermometer
- Sling Psychrometer
- Refractometer
- Plant Reference Chart
- GPS Units
- PVC Quadrats
- Line Level
- String
- Calculators
- Wooden stakes
- Saturation extractor

Background:

- **Vocabulary:** Biotic, Abiotic, Parameter, Ecosystem, Habitat, Intertidal, Desiccation, Adaptation, Transect, Quadrat
- **Reference Material:** <http://www.cnr.berkeley.edu/departments/espm/extension/EROSION.HTM>
- **Equipment Training:** Sling Psychrometer; Refractometer; Multi-meter; GPS; Saturation extractor

Procedure (Engage; Explore; Explain):

1. **Engage.** Have students pretend that they are fiddler crabs (encourage them to act like fiddler crabs, such as walking in all fours, etc.). Ask students why fiddler crabs can live in coastal zones but not in a freshwater lake or mountain regions. Let them discuss how certain ingredients (parameters or factors) for life (water, sunlight, wind, temperature, salinity, elevation, desiccation exposure, etc.) vary in amount from place to place.
2. **Explore.**
 - a. Tell students that they will examine and compare these factors using a transect line. Ask students to hypothesize about which abiotic factor will have the most impact on the types of animals present along the beach transect and why. Remind them to consider the needs of marine organisms in the area and that tolerance levels for each species is different.
 - b. In small groups, have the students run a string perpendicular to the beach from two sturdy stakes: one driven in to the sand just above the high-tide line and one driven in just below the low tide line.
 - c. Students should level the string using a line level and the string should be level with the sand at the high tide end.
 - d. Students will use a tape measure to place four quadrats evenly from the low tide point to the high tide point along the transect. The quadrats should be placed alternately on the left and right side of the transect (see transect reference guide).
 - e. Students should count and record all the items listed on the data sheet.
3. **Explain.**
 - a. Answer and discuss the assessment questions as a group and allow each student to record an answer.
 - b. Review the key concepts (items on pre/posttest).

Sunshine State Standards:

Science: SC.7.L.15.3; **Language Arts:** LA.6.4.2.2; **Mathematics:** MA.7.S.6.1; **Social Studies:** SS.912.G.5.6

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Student Data Sheet

General Information

Full Name:		Date:	
School (teacher):		Time:	
Tide level at start of lab:			

Student Hypothesis and Rationale

Abiotic factors influence where an organism can live and their tolerance to environmental conditions. I think the abiotic factor that will affect the biotic environment along the beach transect line the most is _____, because . . . _____.

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Reference Chart

Transect Line (plan view):

Measure the total distance of the transect line and divide by 4. Place the center of each quadrat at that interval beginning from the ocean side of the transect.

Desiccation Profile:

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Assessment

1. Which one of the abiotic factors varied the most along the beach transect line? Which varied the least?

2. Explain how desiccation (the process of drying out or loss of moisture) affects marine organisms. How have organisms like periwinkle snails, barnacles and fiddler crabs adapted to tidal fluctuations?

3. Do your data support your hypothesis? Whether your hypothesis is supported or not, what can you infer from your observations, measurements, and results?

4. If we were measuring abiotic factors at a freshwater lake, which parameters would be different? Think about temperature, sunlight, wind speed, salinity, humidity, etc.

5. If the sea grasses and salt marsh grasses were removed to make the beach more suitable for swimming and recreation, how might that affect the Periwinkle snails and Fiddler crabs?
