Atlantic Shoreline (GTM) **Teacher's Guide**

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

Topic: Agents in shore line erosion and deposition. Wind, wave action, energy

Summary: Students will use various types of equipment to examine daily and seasonal processes (short and long term) affecting the barrier island beaches. Students will observe and measure wind speed and direction, and the profile and orientation of the beach along a designated transect line.

Objective(s): After completing the field lab, students will be able to:

1. Describe the characteristics, formation, energy forms (potential, kinetic) of waves.
2. Explain how energy from waves affects a shoreline
3. Describe how sand moves along the beach

Ecosystem(s): Coastal Areas, Beaches, Dunes

Equipment:

- Environmental Quality Meters (EQM),
- GPS Units
- Clipboards/data sheets
- Emery Rods
- Transect Tapes
- Beach Diagrams
- Wooden Stakes
- Compasses
- Camera

Background:

- Vocabulary: wave, energy, shoreline, wavelength
- Reference Material: National Geographic Wave Simulator: http://www.nationalgeographic.com/volvooceanrace/interactives/waves/index.html
  Motion in waves: http://www.geocities.com/CapeCanaveral/7639/oceans/wavid.htm
  Making and Using a Wave Machine (Extension): http://sealevel.jpl.nasa.gov/education/activities/ts2enac1.pdf
  Wave Energy and Coastal Landforms: http://www.physicalgeography.net/fundamentals/10ac.html
- Equipment Training: [List equipment that may need to be introduced]

Procedure (Engage; Explore; Explain)

1. Engage the students by asking a specific question that gets to the heart of the activity: **In what ways do geologic processes affect the appearance of the beach? Why do we start our beach profiles at a fixed location each time? How might a hurricane affect the beach environment?**
2. Use the students' answers to ascertain what they already know, clarify any misconceptions, and then ask them to formulate their own hypothesis relating to their own expectations of the outcome of the lab.
3. Teacher/chaperone briefly reviews beach profiling method:
   a. Start by positioning the emery rod at the starting point-which is at the 0 foot mark on the transect tape lying on the beach. Place emery rod on right side of the transect. The person doing the profile should stand behind the inland rod.
   b. Next the profiler should find the horizon, and use their eyes to line up the horizon with the **top** of the lower of the two rods.
   c. Next the profiler should notice that the imaginary line-of-sight intersects with the **higher** of the two rods.
   d. If the point of intersection of the imaginary horizon line is with the nearshore rod, then your beach slope went up. For this reading, count the number of inches (indicated by

the blue and white sections) that is the difference from the point of intersection to the top of the pole. Your reading will be recorded as a positive (+) number.

e. If the intersection of the imaginary horizon line is with the inland rod, then your beach slope went down. To get your reading, count the number of inches (indicated by the blue and white sections) that is the difference from the point of intersection to the top of the pole. Your reading will be recorded as a negative (-) number.

f. Once this reading is recorded, students then swivel the inland rod around *past* the nearshore rod and line up the bottom of each rod onto the next 5 meter marks on the transect tape.

g. Do this all the way down the beach to create the entire beach profile.

4. Students will use the GPS to determine latitude/longitude, the environmental quality meter to determine wind speed and direction, compass to measure the orientation of the beach by using compass headings at either end of a line parallel to the beach, and use a digital camera to photograph the dune and beach at a fixed/predetermined site (near beginning of transect line) to determine change in appearance of the dune/beach over time. Students will record evidence of flora & fauna.
5. Students should rotate through determining measurements and recording readings so all students are actively engaged.
6. After completing the lab, allow the students to answer the discussion questions as a group and explain their answers relating them to the concepts, processes and skills associated with the activity. Students should record their answers individually. At this time, facilitators can introduce/explain the specific concepts and explanations in a formal manner.

Sunshine State Standards:

Science: SC.D.1.3.3.7.1, SC.G.2.3.2.7.1, SC.G.2.3.4.7.1, SC.H.1.3.1.7.1
Math: MA.A.1.3.4, MA.A.3.3.2, MA.A.3.3.3., MA.A.4.3.1, MA.B.1.3.2, MA.B.1.3.4, MA.B.2.3.1, MA.B.3.3.1, MA.B.4.3.1, MA.B.4.3.2, MA.D.1.3.1, MA.D.1.3.2, MA.E.1.3.1, MA.E.1.3.3, MA.E.3.3.1
Geography/Social Studies: NATIONAL GEOGRAPHY STANDARD: #7
Language Arts: LA.C.1.3.1.7.1

Atlantic Shoreline (GTM) Student Data Sheet

General Information

Full Name:		Date:	
School (teacher):		Time:	
*Latitude:		*Longitude:	
**GPS profile should be the same for each LIFE lab to compare data over time*			
Description of start location*:*			
Tide Status:	Incoming/ Outgoing	High / Low	

Observations/Measurements

Position of rod (inland) (Position indicated on **transect tape in feet**)	**Position of rod (nearshore)** (Position indicated on **transect tape in feet**)	**READING** **+** if reading # from nearshore rod **-** if reading # from inland rod	**Evidence of Flora/Fauna**	**Evidence of Humans**
0 Foot Mark	**5 Foot Mark**			

Data sheet continued on the following page!!

Atlantic Shoreline (GTM) Student Data Sheet

Observations/Measurements

Position of rod (inland) (Position indicated on **transect tape in feet**)	**Position of rod (nearshore)** (Position indicated on **transect tape in feet**)	**READING** **+** if reading # from nearshore rod **-** if reading # from inland rod	**Evidence of Flora/Fauna**	**Evidence of Humans**
***Insert last data entry from previous page**				
*	*	*		

Parameters of Beach

Beach Orientation:		
Wind Speed:		
Wind Direction:		
GPS Profile End Location:	Longitude:	Latitude:

Atlantic Shoreline (GTM) **Assessment**

1. What was your group's first and last emery rod reading?

   First:

   Last:

2. Did your first or last reading have the steepest slope?

3. Would it be helpful to know the profile of a river shoreline in the Midwest before flood season? Why or why not?

4. Do you think the sand dune or the beach is a stable place to build a house? Why or why not?

5. If people walk on the dunes or destroy dune vegetation (like sea oats) how might this affect the stabilization of the sand dune? How does this change the profile?

6. Think about the observations you have just made. Did the activity raise new questions? Write a short question (start with "What, Why, Where, When, or How") about something you want to learn more about.

7. Draw a sketch of the profile of the beach

8. Graph your beach profile.

Atlantic Shoreline (GTM) Journal Prompt

Many people are attracted to Florida's beaches. Before you begin writing think about your favorite features of the beach. Think about the attractions the beach has for other residence and visitors to Florida. Describe what you think is the biggest attraction of the beach.

Atlantic Shoreline (GTM) **Reference Chart**

Label the following diagram: (wave trough, wave trough, wavelength)