

## FORMAL ASSESSMENT

# The Jubilee Phenomenon

Each activity in the Estuaries 101 Middle School Curriculum is designed around specific performance tasks. A generalized set of scoring rubrics is provided to judge student progress against these performance tasks. Use the performance assessment indicators in the table below along with the suggested answers in the Teacher Guide to arrive at a score for each performance task.

In addition, you can use the attached Student Assessment handout to conduct a formal assessment at the conclusion of the activity. Use the suggested answers and performance assessment indicators to rate each student's progress.

Performance Tasks	Performance Assessment Indicators		
	Low - Basic	Medium - Proficient	High- Advanced
The student can interpret an animation of how jubilees occur to better understand the causes of a jubilee, including the effects of tides, time of day, wind direction, and levels of dissolved oxygen in the water.	The response is partially correct. There is also evidence of inaccurate, incomplete, or inappropriate skills or knowledge.	The response is correct, and demonstrates accurate understanding of concepts. Minor inaccuracies may appear but there is no evidence of misconceptions.	Evidence of higher-level thinking and the application of the appropriate skills and prior knowledge. The response is correct and complete, and contains elaboration and extension. There is no evidence of misconceptions. Minor inaccuracies should not necessarily lower the score.
The student can perform an experiment to see whether two layers of water can remain separated because of differences in their salinity.			
The student can determine when a jubilee event occurred in Mobile Bay by analyzing tide, weather, and water quality data.			

## Questions and Answers

### 1. Describe the conditions that cause a jubilee event.

- Jubilees usually occur just before or just after sunrise which is before phytoplankton start producing oxygen via photosynthesis.
- Jubilees only occur during the summer. They occur more frequently in June through September when water temperatures are highest.
- Jubilees occur most often when the tide is rising, when ocean water is entering Mobile Bay from the Gulf of Mexico. While most tides along the northern Gulf of Mexico are diurnal, occasionally jubilees also occur during a neap tide.
- The dissolved oxygen level in the water is around 2 parts per million (2 ppm) or below.
- Jubilees occur when there is a gentle easterly wind blowing the surface water away from the shore toward the middle of Mobile Bay.

**2. Using the chart above, explain why a jubilee event did not occur on the morning of August 25?**

August 25 met all of the jubilee conditions except that the wind was not out of the east when the dissolved oxygen was low at dawn.

**3. What does it mean when dissolved oxygen levels are described as being in the marginal zone?**

Dissolved oxygen levels between 2 ppm and 4 ppm are considered marginal. DO levels in this range will cause aquatic organisms to be stressed.

**4. The graph shows dissolved oxygen decreasing overnight and rising again during daylight hours. Explain a possible cause for this variation.**

At night, phytoplankton is unable to carry on photosynthesis and must actually take in tremendous quantities of dissolved oxygen from the water in order to sustain them. The more phytoplankton in the water, the more dissolved oxygen gets taken out of the near-surface water at night.

## Reflection Question

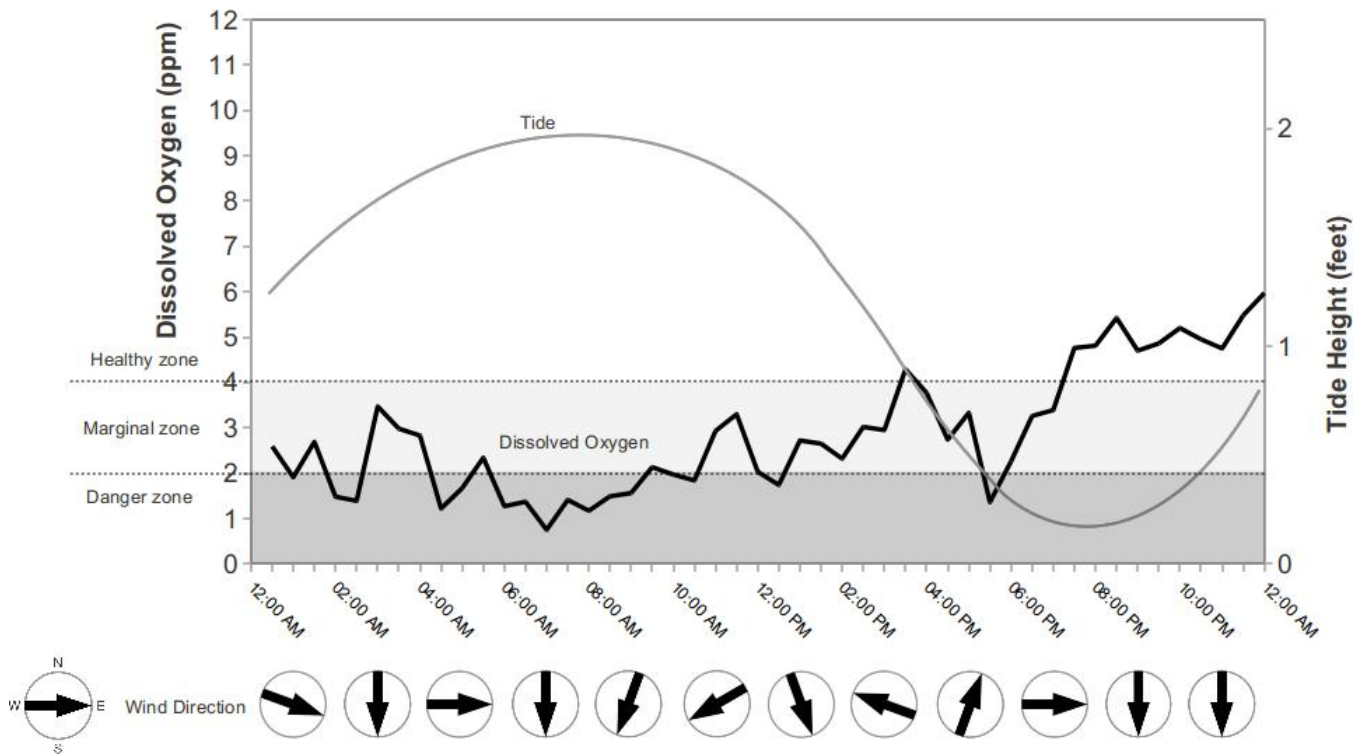
**How does understanding a jubilee event help you to understand changing water conditions in the estuary?**

Student answers will vary.

## STUDENT ASSESSMENT

## The Jubilee Phenomenon

Bon Secour  
Dissolved Oxygen, Tide Height & Wind Direction  
August 25, 2011



1. Describe the conditions that cause a jubilee event.
2. Using the chart above, explain why a jubilee event did not occur on the morning of August 25?
3. What does it mean when dissolved oxygen levels are described as being in the marginal zone?
4. The graph shows dissolved oxygen decreasing overnight and rising again during daylight hours. Explain a possible cause for this variation.

## Reflection Question

How does understanding a jubilee event help you to understand changing water conditions in the estuary?