

# 2011 North Carolina Envirothon Oral Presentation Problem

## Team Role

During this exercise your team will take on the role of a scientific advisory board that has the responsibility of determining the primary causes of several environmental problems and proposing practical solutions to these problems. Use your knowledge of the NC Envirothon resource materials as well as the data, maps, and background information that has been provided to help with this problem.

You will be allowed a maximum of 10 minutes to present your findings and recommendations. Please note that points will be deducted for presentations that are less than 9 minutes in length.

## Problem

On June 25, 2009, a large fish kill occurred in the Oyster River, near the town of Bayville. The loss of thousands of fish appeared about 3 days after a series of heavy rain events. Prior to the rains, water temperatures averaged near the low 70's °F. Immediately following the rains, there was a period of extremely hot sunny weather with daytime highs in excess of 100°F. This resulted in water temperatures quickly climbing to near 80°F.

The area of the fish kill has been shown on the included maps. Water quality data was collected on June 26, 2009 and is included in the table, below.

A related concern your team should address is the decline of the local shellfish industry centered in Bayville. The annual oyster harvest has been steadily decreasing for years and recently many local shell fishing areas have been closed due to unsafe levels of fecal coliform bacteria.

## Assignment

Your team should address all of the following:

1. Determine the most likely cause of the fish kill.
2. Determine the primary environmental problem(s) and their causes that contributed to the fish kill.
3. Make specific recommendations for dealing with each of the environmental problem(s) listed in item 2 above.
4. Determine the cause(s) for the decline of the oyster harvest and the closing of shell fishing areas.
5. Make specific recommendations for dealing with each of the environmental problem(s) listed in item 4 above.

The solutions your team proposes should be practical and use sound science. When weighing which solutions you will include with your recommendations; please take into account the possible political,

economic, and social ramifications of adopting these solutions. In addition to addressing immediate concerns, thought should also be given to strategies that will lead to long term sustainability.

### Data

The following table shows data that was collected at four sample locations on the day following the onset of the fish kill. Sample Point C was located within the fish kill area. All other points were outside of the fish kill area. See the attached maps for more information about the location of the sample points.

<b>Water Quality Data</b>			
<b>Location of Measurement</b>	<b>Turbidity (Secchi Depth)</b>	<b>Dissolved Oxygen</b>	<b>Ammonia</b>
<b>Sample Point A</b> Oyster River Upstream of Bayville	44"	10 ppm	.2 ppm
<b>Sample Point B</b> Oyster River At Bayville Bridge	30"	12 ppm	4.2 ppm
<b>Sample Point C</b> Oyster River Just South of Bayville	8"	2 ppm	2 ppm
<b>Sample Point D</b> Confluence of Oyster River & Oyster Bay	40"	10 ppm	.05 ppm

### Background

The Oyster River watershed lies within an area that is approximately 70% agricultural land with the remainder of the land being primarily forested. The only significant urbanized area within the watershed is the town of Bayville.

For the past 200 plus years, agriculture has been an important part of the area's economy. The nearly level to gently sloping fine-loamy Coastal Plain soils in the Oyster Bay watershed are primarily used to grow corn, soybeans, and small grain. Due to their poor native fertility, these soils require the use of lime and fertilizer to optimize yields.

Bayville is a charming historic waterfront town located on the scenic Oyster River, near Oyster Bay. It has a population of 10,911 year round residents with a much higher population during the warm summer months. Traditionally Bayville's economy has been dependent upon the local seafood industry and to a lesser extent the agricultural production of the surrounding areas. In recent years tourism has grown in importance.

The infrastructure in the older sections of Bayville is aging. The wastewater treatment plant is old and is beyond its capacity to treat new wastewater. In addition, the downtown area of Bayville has a stormwater collection system that discharges directly into the Oyster River.

The mainstay of the Bayville economy has always been its local seafood industry. For generations, fishermen have made their living by harvesting oysters, crabs, fish, and shrimp from the Oyster River and Oyster Bay. Unfortunately the seafood industry has been troubled the past several years due to a declining oyster harvest and the closing of many local shell fishing areas.

To counter the decline of the seafood industry, Bayville has begun promoting itself as a tourist destination for boating, sport fishing, and golfing. The town currently has two full service marinas with a variety of charter boats available. The waterfront Sweet Bay Resort with its beautifully landscaped gardens opened two years ago and offers golfing and 5 star accommodations. In addition, the Bayville Country Club offers its famous 18-hole championship golf course.

Future economic development for Bayville looks promising. South Bayville is growing rapidly and a large area surrounding Little Oyster Creek southeast of town is currently under consideration for another golf resort and additional housing developments. Due to the inability to hook up to the Bayville wastewater treatment plant, all new development in the past 8 years has utilized onsite wastewater systems (septic systems).

The waterfront area of Bayville has some current water quality challenges. Citizens are increasingly concerned about the safety of swimming at Shell Point Park. Last summer the swimming area was frequently closed due to unsafe levels of coliform bacteria in the water. Also, in the South Bayville area near the new developments, citizens have been complaining that the water often turns brown after a heavy rain.