

Microscopes

Case Study

The county health department was called by the President of the Lonely Hills Homeowners Association. Two residents out for an early morning run had noted several dead fish along the shore of the community's private lake. As the morning progressed more dead fish were observed floating in the lake. Residents were concerned that the lake had been poisoned. Since the lake abuts the golf course, playground and the backyards of several residences, homeowners feared for the health of their children and pets. The county health department sent an investigator to the site.

The investigator noted that the weather in the region had been sunny, warm and dry during the previous 5-day period. In conversations with the grounds keeper the investigator learned that the pond was fairly shallow, only 15 feet deep at its deepest point. The pond was occasionally treated for algal overgrowth, but no treatment had been done this current season. Weeds along the bank were also occasionally treated, but no direct spraying had been done on the lakeshore this season either. The greens of the golf course are adjacent to the lake. The golf course uses a regimen of twice daily watering and biweekly fertilization which commenced three weeks earlier (as the grasses were leaving dormancy) and had just been repeated 7 days before. The grounds keeper noted that after fertilization the lake "greened-up" in response to the fertilizer (30-10-10) run-off, but he wasn't concerned because the lake started looking more normal 3-4 days earlier. The investigator removed water samples for testing back in the lab.

In the lab, tests were performed on the water sample along with a microscopic examination of the water. The results indicated the dissolved oxygen (DO) level in the lake water was less than 2 mg/L. Acceptable levels of DO for fish is between 5-7 mg/L. Nitrogen and phosphorus were slightly elevated; nitrogen levels were higher than phosphorus levels. Testing for other toxic environmental compounds, both metal and non-metal came back negative. Microscopic examination of the water revealed high levels of bacteria, high levels of cyanobacteria and high levels of green algae.

The investigator concluded that the lake was not intentionally poisoned but experienced eutrophication resulting from management practices. He proposed run-off from the golf course coupled with the warm, dry weather conditions led to an algal bloom. As the algae depleted the nutrients from the fertilizer run-off and began to die; oxygen levels plummeted due bacterial metabolism involved in the process of algal decay. He recommended that residents avoid recreational activities in the lake for at least two weeks. He suggested that the Association remove all the dead fish, revise their golf course fertilization regimen and consider installing a fountain or some form of water aeration to improve dissolved oxygen levels.

1. Before reading the investigator's recommendation, develop a hypothesis for this fish kill? What happened in this lake?
2. How was the microscopic examination of the water sample important to his study?