



FISH DIE-OFF IN CENTRAL PARK LAKE



by Larry Eichert 8/15

When my wife and I returned from vacation I found out from friends, and through the social media, about the event. The information provided was not enough to determine the exact cause for the die-off. Therefore we will consider some of the possible explanations. Fish kills are often the first visible signs of environmental stress. Many fish species have a relatively low tolerance of variations in environmental conditions and their death is often an indicator of problems in their environment. Some of the most common causes are reduced oxygen in the water, which in turn may be due to a number of factors such as; drought (not likely), algae blooms (could contribute), overpopulation (possible) or a long term increase in water temperature (could be). Infectious diseases and parasites can also lead to fish kill. Toxicity is a real but far less common cause of fish kill. The most common natural cause of fish kills is "Ecological hypoxia" (oxygen depletion). Hypoxia may be brought on by factors such as algae blooms, droughts or high temperatures. If we knew the specific fish species, or had D.O. (dissolved oxygen) test results, plus the amount of surface algae (algae bloom) it would make it possible to determine the cause. Each fish species have certain D.O. ppm. required for survival. (ex. trout 16 ppm, carp 9 ppm etc.)

An algae bloom will combine H_2O and CO_2 to make $(CH_2O)_n$ into various sugars during photosynthesis and liberates O_2 . Some of the O_2 given off is trapped in the form of bubbles under the algae and then released into the atmosphere, instead of being trapped between the water molecules being re-dissolved, (this is most noticeable in the patches of "pond scum" – various different algae that cover the water surface). Aerobic bacteria will consume more of the D.O. and produce CO_2 in respiration, thereby decreasing the D.O. further. Eventually the D.O. becomes so depleted that the fish suffocates. The first signs of this suffocation can be seen when fish come to the surface of the water gasping for air.

Another possibility would be the increase in water temperature (thermal pollution). This also allows the D.O. to be liberated, due to the fact that all the molecules are moving faster, and if the surface area is increased by rain fall, more evaporates off the surface. But doesn't rain increase the D.O. on the water? Yes, however there is a delicate balance between both of these factors. If the water level is higher and plant life along the banks is then under water it begins to decay, increasing the amount of CO_2 and other organic compounds into the water. This will increase the amount of anaerobic bacteria (do not need O_2) activity which will end up producing ethane and methane gases. Another factor to consider is the barometric pressure. When it rains the pressure in the air decreases, because air pressure is related to the gases in the air, not the water it contains. That is why the barometer drops when it rains and raises when there are less water molecules in the air. With less pressure pushing down on the surface, the lighter molecule will escape, (ex. H_2O has an atomic mass of 18AMU and an oxygen atom has an atomic mass of 16AMU). By having less mass than water molecules, it can escape easier from the water, especially if the water molecules are moving faster due to an increase in water temperature, or wave action.

We still need to consider over population as a possible cause. When a fish population exceeds the carrying capacity of its surroundings more stress is placed on the population. This can cause a decrease in food supply, and cramped living conditions. Both of these put more stress on the specific population and make them more susceptible to disease and starvation. Signs of disease include sores, missing scales or lack of slime, strange growths or visible parasites, and abnormal behavior – lazy, erratic, gasping at the water surface or floating head, tail or belly up. Still another factor could be that fish are generally weaker after spawning and are less resilient than usual to smaller changes in the environment.

As sad as it seems, the death of the fish provide a food supply for the scavengers of the environment, our local vulture population plus other animals. As the fish decompose, that scent in the air attracts these animals to the sight to feast on the remains, and to supply food for themselves and their newly developing young. In this manner, the nutrients from the fish are recycled back into the environment through other members of the food chain. Ultimately the waste products given off from those who eat the fish remains will recycle nutrients into the soil for plant growth.

These are some possible scenarios to this event. I hope that this was helpful to all who had questions about the fish die-off at Beacon Lake in Central Park.