

What is the Relationship Between the Speed of the Water and the Amount of Dissolved Oxygen in the Truckee River?



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Introduction

- Aquatic animals need oxygen to survive
- Oxygen can enter water through:
 - Turbulent areas of water
 - Elevation: higher elevation has less dissolved oxygen
 - Animals living in river need dissolved oxygen
 - Cold water hold more dissolved oxygen than warm water
 - Vegetation put dissolved oxygen into the water because of photosynthesis, and shading from the plants makes the water cooler
- If the dissolved oxygen level drops too low, hard metals can dissolve into the water and poison organisms

Procedure

- Measure stretch of 3 meters along the river
- Put in floating instrument and track the amount of time taken to flow from the start of the area to the end
- Convert to seconds/meter
- Take 4 measurements of dissolved oxygen in area
- Take temperature

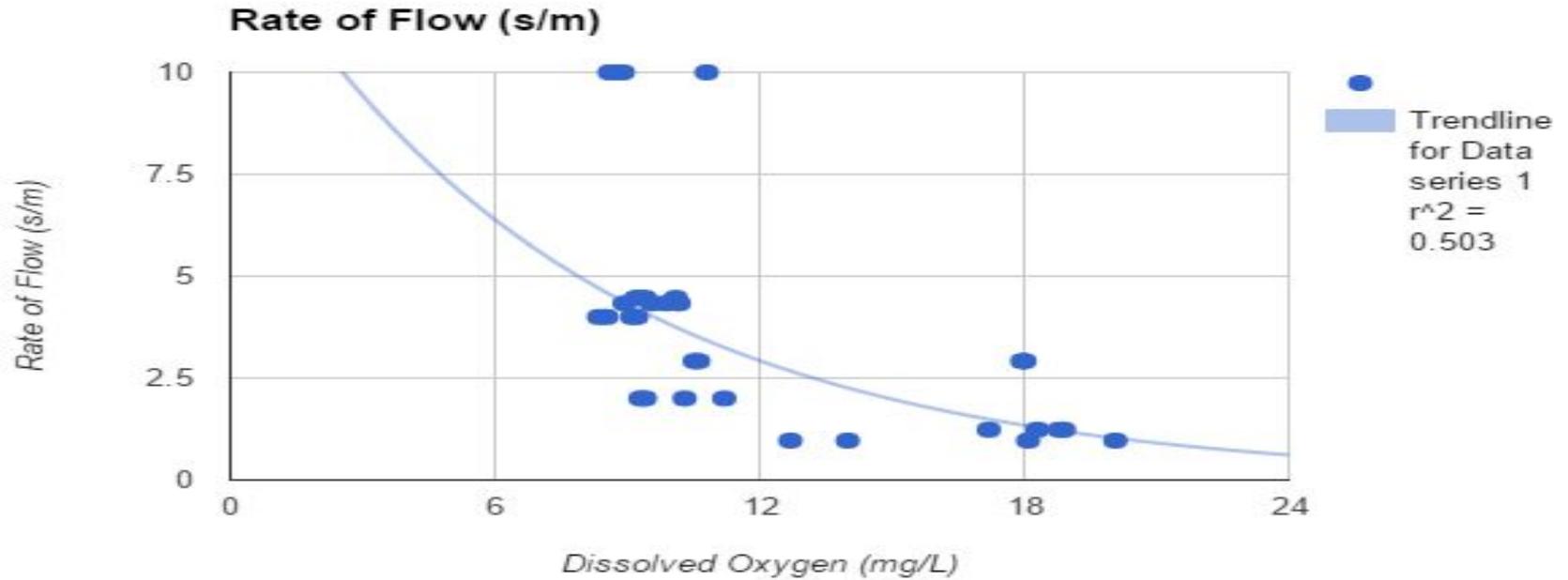
Hypothesis

Areas with faster flowing water and/or rapids will have higher amounts/ levels of dissolved oxygen because it will be more difficult for the aerobic organisms to survive. The faster moving rapids will also trap more oxygen

Materials

- DO probe
- Buoyant sticks
- Meter stick
- Timer
- Truckee River
- Thermometer
- Boots that make Andrew look silly

Results



Results Continued

P value is less than .0001

The difference of the means of DO and speed is 8.226

T=9.74

DF=62

Standard error of difference is .849

The standard deviation for DO is 3.95

The standard deviation for speed is 2.73

Discussion

The graph above shows the relationship that we had hoped to observe. In areas with higher amounts of dissolved oxygen, the flow of the water was faster. The relationship between the two variables is inverse, because as the flow of the water decreases in seconds per meter, the dissolved oxygen increases. The R^2 of the graph is .503, showing that there is a moderate correlation between dissolved oxygen and the flow of water, however the value is not large or small enough to state that the two variables are independent or not independent of each other.

Discussion Continued

The areas with faster flowing water occurred around rapids, and the areas with slower flow rates occurred around the shoreline. Thus, the areas with faster flowing water, especially white water rapids, will have higher amounts of dissolved oxygen. This idea can be applied to any river regardless of location. This is because many rivers behave in the same way. Areas with slower flowing water will have fewer aerobic organisms because of the difficulty to survive in such difficult conditions. The faster flow makes it more difficult for organisms to control their interaction with their environment.

Discussion Continued Further

In the river that we examined, the temperature of the water didn't vary much. The mean was 15.375 degrees C, with a standard deviation of .3535 degrees. Because there was such great changes in the dissolved oxygen, but the temperature of the water was fairly constant in all areas of the river, it is very difficult to state that dissolved oxygen is or is not independent of temperature