

# Conductivity

## What is conductivity and Why does it matter?

Water's conductivity is its ability to conduct electricity, and is a measure of the solution's total dissolved solids. Salts and other organic and inorganic substances dissolve in water. If you have pure water with absolutely no salts or particles, electricity will not be conducted and conductivity will be 0. When we measure conductivity, we are measuring how easily electricity is flowing through the water and we get an indirect estimate of how many salts are in the water. These salts naturally come from the various rocks and soils that make up waterbodies, but can also result from human activities as well, such as urbanization and rain runoff from land.

Fish and other organisms that live in freshwater cannot tolerate large increases in the saltiness of the water because they will not be able to keep water in their bodies, although various organisms are adapted to a wide range of environments naturally.

Climate change may increase the conductivity of freshwater lakes if warmer conditions increase evaporation. This could result in stress to fish and other animals that live in water. Pollution can also increase conductivity of lakes and rivers because industrial and residential wastewaters often have high conductivity.

Urbanization is the primary cause of stream degradation in the US. Once a watershed is urbanized, water flow patterns can change, elevated nutrients and contaminant concentrations can be seen, and there are decreases in numbers and variety of fishes and macroinvertebrates.

For Maryland waters, suitable conductivity levels for fish and macroinvertebrates have been established based on sampling done by the Maryland Biological Stream Survey (MBSS). For fish a conductivity level greater than 171  $\mu\text{S}/\text{cm}$ , and for macroinvertebrates a conductivity level greater than 247  $\mu\text{S}/\text{cm}$ , indicates the potential for damaging effects on species variety and presence.

## How do we measure conductivity?

The measure of conductivity is usually expressed in terms of microsiemens/cm ( $\mu\text{S}/\text{cm}$ ). It estimates the amount of total dissolved solids/salts (TDS), or the total amount of dissolved ions in the water, some with a negative charge, and some with a positive charge. Conductivity is best measured directly in the lake, river, or stream, and if you measure an increase in  $\mu\text{S}/\text{cm}$ , you are measuring an increase in the conductivity of water.



For more information please contact the Fisheries Habitat and Ecosystems Program:  
<http://www.dnr.state.md.us/fisheries/fhep/>

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