Conductivity in streams and rivers is affected primarily by the geology of the area through which the water flows. Streams that run through areas with granite bedrock tend to have lower conductivity because granite is composed of more inert materials that do not ionize (dissolve into ionic components) when washed into the water. On the other hand, streams that run through areas with clay soils tend to have higher conductivity because of the presence of materials that ionize when washed into the water. Ground water inflows can have the same effects depending on the bedrock they flow through.

Discharges to streams can affect conductivity levels. A failing sewage system or runoff would raise the conductivity because of the presence of chloride, phosphate, and nitrate; an oil spill would lower the conductivity.

Conductivity can be used as a salinity measure and therefore is useful as a general measure of stream water quality. Each stream tends to have a relatively constant range of conductivity that, once established, can be used as a baseline for comparison with regular conductivity measurements. Significant changes in conductivity could then be an indicator that a discharge or some other source of pollution has entered a stream.

Water with high conductivity measurements have more solids dissolved in the water, therefore the water is more dense. Usually the more dense the water, the deeper it will sink in the aquatic system. This movement of water can set up density driven currents or circulation in the aquatic system.

Expected ranges for conductivity:

Seawater (35 ppt)
Brackish water (1 to 10 ppt)
Fresh water (0 ppt)

Measurement
In the SENSE IT project, the conductivity sensor data is used to indicate salinity. Salinity is a measure of the total amount of dissolved material, or the salt content, in water.

Salinity is the number of grams (g) of material in 1000g of water. For example, if seawater has 35g of salt in 1000g of water, it has a salinity of 35‰ (parts per thousand).

1 gram/Liter = 1 part per thousand (ppt)

Practical Salinity Units (PSU) are often used to describe salinity: a salinity of 35‰ equals 35 PSU.

1 gram/Liter = 1 part per thousand (ppt) = 1 Practical Salinity Unit (PSU)