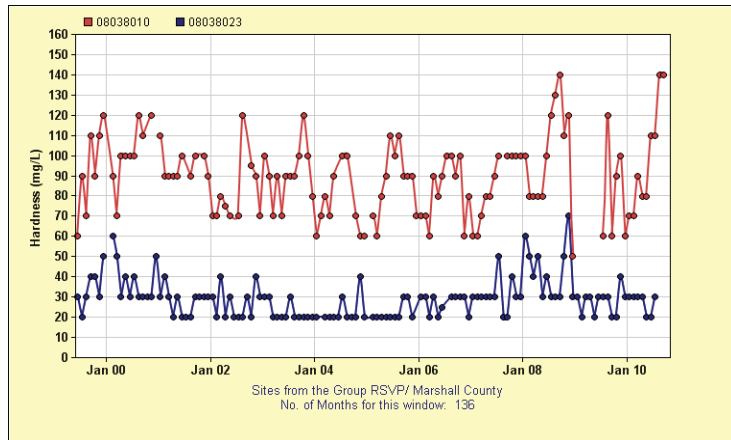


Hardness: Principles

Hardness is primarily the concentration of calcium and magnesium ions in water. Limestone is a natural source of hardness. The chemical name of limestone is calcium carbonate (CaCO_3) or magnesium carbonate (MgCO_3).

- Animals and plants require calcium and magnesium for life. Calcium is an important component of cell walls, shells and bones of many aquatic organisms. Magnesium is a component of chlorophyll, which is necessary for photosynthesis in green plants.
- Hardness of seawater is 6,000 mg/L or more.
- Hard water can cause problems by leaving scaly deposits in pipes and appliances, and decreasing the cleaning action of soap and detergent.
- Most fish and aquatic organisms live in waters with hardness between 15 and 200 mg/L. Fish reproduction may be limited in waters with hardness less than 15 mg/L or greater than 200 mg/L. Long-term consumption of water with hardness greater than 350 mg/L can be harmful to humans.

Water Hardness as CaCO_3	
0 – 20 mg/L	Soft
21 – 60 mg/L	Moderately soft
61 – 120 mg/L	Moderately hard
121 – 180 mg/L	Hard
> 180 mg/L	Very hard



The graph to the right shows Total Hardness measurements from two monitoring sites in Marshall County, Alabama: AWW Site Code 08038010 in Turkey Creek, south of AL Hwy 75 and AWW Site Code 08038023 in Whippoorwill Creek north of AL Hwy 75. The two monitoring sites are separated only by about three miles (see map), however, the Total Hardness measurements are significantly higher in Turkey Creek.

