

pH Factoids

pH is a measurement of how acidic or basic something is. It is measured on a scale from 0-14. Acidic values are from 0-7, with 0 being the most acidic. Basic numbers are from 7-14. A neutral pH is 7

The pH of a healthy river is 7.4. If it reaches an eight, it's a "city river", and is usually somewhat polluted. If it reaches a nine, it is undrinkable.

A pH range of 6.0 to 9.0 appears to provide protection for the life of freshwater fish and bottom dwelling invertebrates. Extremes in pH can make a river inhospitable to life.

Low pH is especially harmful to immature fish, fish eggs, and insects. Acidic water also speeds the leaching of heavy metals harmful to fish. This process is important in surface waters.

Runoff from agricultural, domestic, and industrial areas may contain iron, aluminum, ammonia, mercury or other elements. The pH of the water will determine the toxic effects, if any, of these substances.

Natural factors that influence pH:	Human factors that influence pH:
<ul style="list-style-type: none"> • Calcium carbonate - can combine with the extra hydrogen ions that alter water's pH. When these minerals are present, the pH of the water doesn't change as much when acids or bases are added to the water. We call this buffered water. Many soils in the west contain these minerals. Watersheds with few of these buffering minerals will produce poorly buffered water. Any additional acid will change the pH of these waters. • Pine or fir forests - decomposing needles of these trees add acidity to the soil and also influence the acidity of nearby streams. • Water table water - percolates through soils, and if the soils are buffered, the pH may be somewhat higher (7-8). • Precipitation - when precipitation falls through the air, it dissolves gases like carbon dioxide and forms a weak acid. Natural, unpolluted rain and snow is slightly acidic. Precipitation usually has a pH between 5 and 6. • Seasons - in the fall when leaves and needles fall into the water and decompose this may increase the acidity of the water. • Photosynthesis and respiration - during photosynthesis plants remove carbon dioxide from the water. This can raise the pH in water. Since plants do photosynthesis when there is sunlight, the pH of the water will be highest during the middle of the afternoon, and lowest just before sunrise. 	<ul style="list-style-type: none"> • Acid rain - sulfuric acid (produced by coal burning industries) and nitric acid (produced by automobile engines) are main contributors to acid rain. Luckily in Montana the buffering soils help to decrease the effects of acid rain. • Point source pollution - dumping industrial pollutants directly into water can affect the pH of the water. A change in the pH of water can alter the behavior of other chemicals in the water. The altered water chemistry may affect aquatic plants and animals. For example, ammonia is harmless to fish in water that is acidic. However, as pH increases ammonia becomes toxic. Also, a lower pH will cause heavy metals such as cadmium, lead and chromium to dissolve more easily. Many heavy metals become toxic when dissolved in water. • Mining - may expose rocks to rainwater and produce acidic runoff. Mining drainage can introduce acids into a waterway, if it is poorly buffered the pH may reach toxic levels.