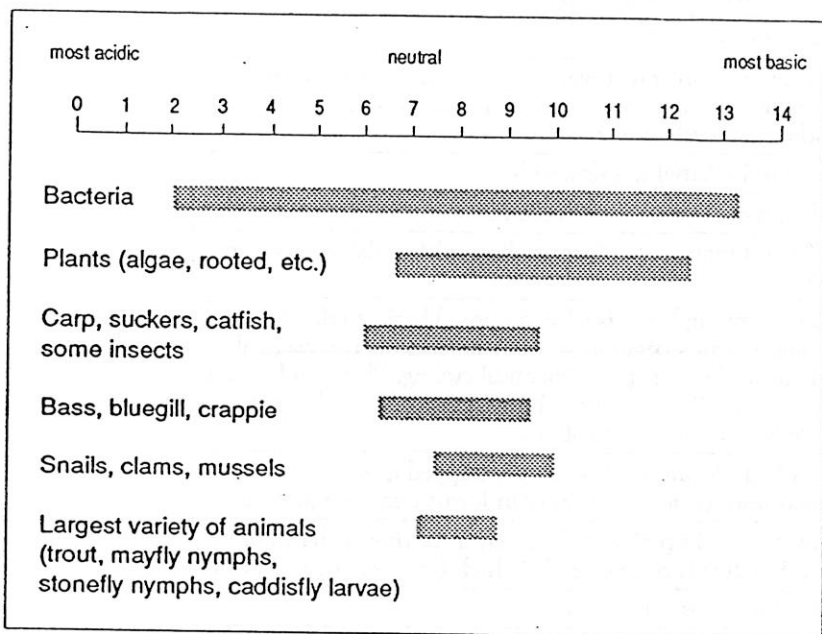


How pH Affects Living Things



Source: *Field Manual for Water Quality Monitoring*
An Environmental Education Program for Schools

Figure 3.12. pH ranges that support aquatic life.

Limiting pH Values		Effects of Some Scientific Studies
Minimum	Maximum	
3.8	10.0	Fish eggs could be hatched, but deformed young were often produced.
4.0	10.1	Limits for the most resistant fish species.
4.1	9.5	Range tolerated by trout.
4.3	—	Carp died in five days.
4.5	9.0	Trout eggs and larvae develop normally.
4.6	9.5	Limits for perch.
5.0	—	Limits for stickleback fish.
5.0	9.0	Tolerable range for most fish.
—	8.7	Upper limit for good fishing waters.
5.4	11.4	Fish avoided waters beyond these limits.
6.0	7.2	Optimum (best) range for fish eggs.
1.0	—	Mosquito larvae were destroyed at this pH value.
3.3	4.7	Mosquito larva lived within this range.
7.5	8.4	Best range for the growth of algae.

Source: *Water, Water Everywhere*
Water Quality Factors Reference Unit

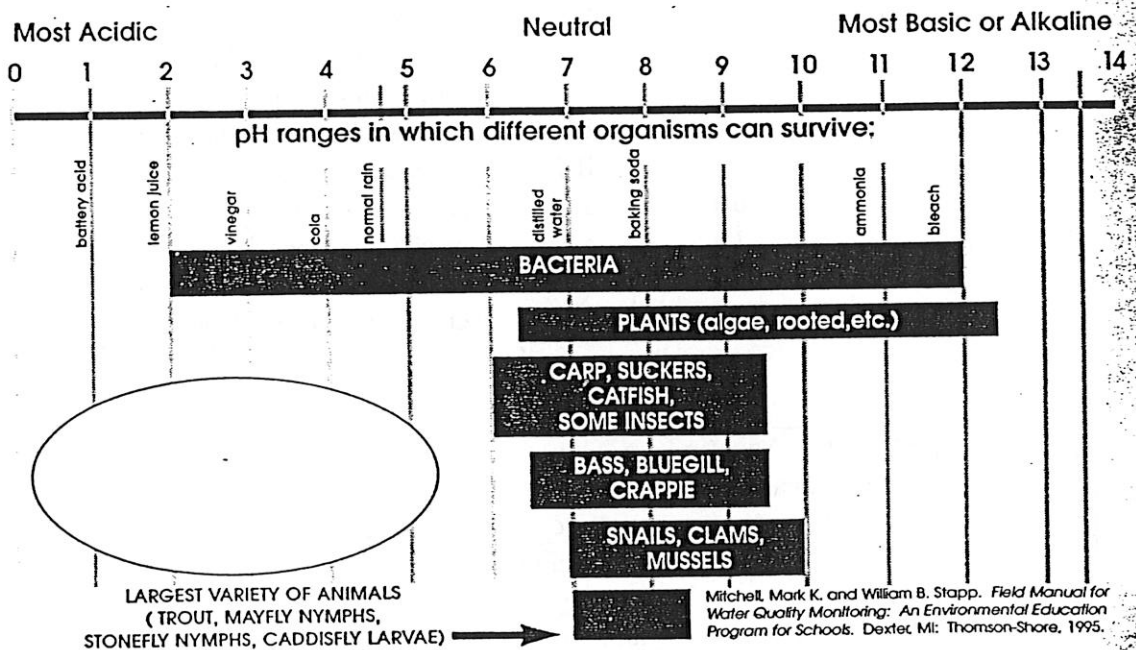
pH level	Effect On Aquatic Life
<5.0	Few fish can survive, bottom of waterway is covered with undecayed material, and mosses may dominate areas near the shore
~5.0	Less desirable mosses and plankton begin to invade the waterway, some less tolerant fish populations begin to disappear
~6.0	Crustaceans, insects, and some plankton species begin to disappear

Source: Environment Canada, FAQ
<http://www.ns.ca/msc/as/acidfaq.html>

Figure 3.3 Effects of pH levels on aquatic life

AT pH:	EFFECT ON AQUATIC LIFE:
3.0 - 3.5	Unlikely that fish can survive for more than a few hours in this range although some plants and invertebrates can be found at pH levels this low.
3.5 - 4.0	Known to be lethal to salmonids.
4.0 - 4.5	All fish, most frogs, insects absent.
4.5 - 5.0	Mayfly and many other insects absent. Most fish eggs will not hatch.
5.0 - 5.5	Bottom-dwelling bacteria (decomposers) begin to die. Leaf litter and detritus begin to accumulate, locking up essential nutrients and interrupting chemical cycling. Plankton begin to disappear. Snails and clams absent. Mats of fungi begin to replace bacteria in the substrate. Metals (aluminum, lead) normally trapped in sediments are released into the acidified water in forms toxic to aquatic life.
6.0 - 6.5	Freshwater shrimp absent. Unlikely to be directly harmful to fish unless free carbon dioxide is high (in excess of 100 ppm).
6.5 - 8.2	Optimal for most organisms.
8.2 - 9.0	Unlikely to be directly harmful to fish, but indirect effects occur at this level due to chemical changes in the water (see next page).
9.0 - 10.5	Likely to be harmful to salmonids and perch if present for long periods.
10.5 - 11.0	Rapidly lethal to salmonids. Prolonged exposure is lethal to carp, perch.
11.0 - 11.5	Rapidly lethal to all species of fish.

Source: *The Monitor's Handbook*
Lamotte Company



Source: *Student Discovery Book*
Cuyahoga Valley Environmental Education Center