

Temperature: Principles

Air and water temperature are measured using a thermometer with a Centigrade (Celsius) scale (°C). To convert from °F to °C, use the formula $^{\circ}\text{C} = (^{\circ}\text{F} - 32) \times 5/9$.



Relationship between the Centigrade and Fahrenheit scales

°C	0	10	15	20	25	30	35
°F	32	50	59	68	77	86	95

- Temperature affects the physical and chemical properties of water and greatly influences aquatic organisms by affecting their feeding, reproduction, and metabolic rates.
- Temperature affects how much **dissolved oxygen** (DO) water can hold (see DO Saturation, page 60), and how quickly **nutrients** will cycle through the aquatic system.
- Water can form layers (strata) of different temperatures in reservoirs, lakes and ponds.
- Water temperatures may be increased by discharges from industries or power generating plants. **Runoff** from heated impervious surfaces can also increase water temperatures. **Thermal pollution** is a problem in some streams and lakes.
- Stream water temperatures are often lower than air temperature because of groundwater inflows or shading by streamside vegetation. If the riparian vegetation is cleared, stream temperatures may be colder in winter and warmer in summer because of a loss of this buffer.
- Most aquatic organisms can tolerate gradual changes in temperature, but drastic changes can cause thermal stress. Temperatures above 32 °C may be lethal to many aquatic organisms. Some Antarctic fish die at temperatures above 4 °C!

Temperature Tolerances of Some Common Fish

Temperature guild	Species	Optimum range °C	Upper lethal limit °C
Coldwater	Rainbow trout	13 – 21	24 – 28
Coolwater	Yellow perch	19 – 21	21 – 30
Warmwater	Channel catfish	21 – 27	30 – 35
Tropical	Blue tilapia	23 – 30	29 – 39

Water temperature regulations in Alabama are found on page 21.