It’s Time to Think about the Thermocline

During summer the thermocline often becomes a factor that can influence bass habitat use and movements. A thermocline is a section of lake water where the water temperature drops drastically across a small change in water depth. This occurs because warm, surface layers of water are much less dense than the cooler, deeper waters. Warm and cool waters separate due to their difference in density, so that the warm layer (called the epilimnion) is essentially perched on top of the cool water layer (the hypolimnion), with little mixing between the two.

The thermocline is the relatively thin layer of water lying in between the warm epilimnion and cool hypolimnion, and in this region the water temperature drops rapidly with every foot of increasing depth. You may have actually seen the thermocline on your depthfinder, because the density change in the water here is strong enough to deflect sonar from today’s sensitive electronics.

During a hot summer day you might expect that fish would prefer the cool hypolimnion, but dissolved oxygen levels become an important part of this discussion. Most dissolved oxygen enters water through production by phytoplankton (microscopic plants) or rooted aquatic plants. The warm epilimnion supports nearly all of a lake’s phytoplankton and/or aquatic plants, meaning that it is in this zone where most of the oxygen is produced. Below the thermocline, light becomes limiting and aquatic plants cannot continue to grow, so oxygen is not produced. Because the cooler hypolimnion does not support plant growth and is isolated from the warm surface layers, it usually becomes devoid of oxygen by mid summer. The hypolimnion is therefore frequently not suitable habitat for fish.

The water depth where the thermocline occurs is important for fish movements during summer, and this depth can vary substantially among water bodies depending on lake productivity. In highly productive water bodies with high nutrient levels (nitrogen and phosphorus), phytoplankton becomes very abundant. Dense phytoplankton will shade light levels at relatively shallow depths, causing oxygen to decline. In extreme cases, I’ve seen highly productive farm ponds with phytoplankton blooms that cause little light below depths of about 4-6 feet, meaning that below this depth in the summer there will be very little oxygen. Lakes where this occur would look very green, and you would probably be unable to see a white object at depths more than about a foot below the surface.

Alternately, in lakes with very low nutrient levels, the water is clearer and light can penetrate much deeper, causing adequate oxygen to occur at much deeper depths. Very clear lakes can contain well oxygenated water at depths of 40 feet or more during summer. Thus, the depth where the thermocline exists will differ widely among lakes depending on their productivity, even for lakes that are only a few miles apart but differ widely in nutrient content. It depends on the lake!

Not all lakes will stratify. In Florida, the shallow nature of many of the lakes means that wind energy effectively mixes the entire water column, and finding low dissolved oxygen
at deeper depths is rare during summer. In rivers or river-type impoundments, water flow through the system can mix the entire water column and prevent a thermocline from developing.

However, many large lakes or impoundments will stratify during summer. Most of the reservoirs I’ve seen will tend to develop a thermocline at somewhere between about 15 and 30 feet deep in early summer. The thermocline will disband in the fall when surface waters cool, creating lake “turnover” where the warm and cool layers will mix.

Back to summer. Not all bass will be found around the thermocline, because bass will go where the habitat and food is adequate, and many lakes support quality habitat and abundant food in shallow water even during the heat of the summer. While sampling fish with electrofishing, we often find bass in very shallow water during summer in some lakes but not in others depending on the habitat characteristics of a particular water body.

However, many prey species and predators will aggregate around the thermocline particularly during the daytime. This zone represents the coolest water in the lake that contains adequate dissolved oxygen for use by fish. It also harbors more zooplankton (micro-crustaceans) during daylight hours and thus provides high food abundance for prey fish. Knowing where the thermocline occurs is a tool you should consider when learning the habits of bass. You can usually find the thermocline with your depthfinder, and identifying this zone can be important for understanding fish movements and habitat use this time of year.