

Whitefish Pilot

WHITEFISH LAKE CHANGES WITH THE SEASONS

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Whitefish Lake often appears calm on the surface but that's not the case below. Beginning in late spring, sunlight and warmer weather heat the upper layers of the lake, while deeper waters remain cooler. The top layer, where water is in contact with the atmosphere, is called the epilimnion. Once stratified, the warmer water circulates at a relatively consistent temperature in this zone. Below the epilimnion is the metalimnion, the transition zone between the surface and deep layers. Within the metalimnion is the thermocline — the narrow plane of the water column at which temperature decreases rapidly with depth.

Below the metalimnion is the hypolimnion, where cool, mostly nonturbulent water, which is denser than warm water, remains in the bottom layer of the lake. Water is densest at 39.2 degrees F (4 degrees C) at sea level and becomes less dense at both higher and lower temperatures. When the epilimnion and hypolimnion do not mix because wind currents or other external energy sources are unable to mix surface energy throughout the water layers, the lake is considered stratified.

As summer progresses, the epilimnion deepens and the temperature and density differences between the upper and lower layers becomes more distinct and a stronger thermocline is formed. As the weather cools in fall, the temperature and density difference between the epilimnion and the hypolimnion is reduced. When surface and bottom water approximate the same temperature and density, fall winds can mix the lake (fall turnover). As temperatures consistently drop, the surface water continues to cool allowing freezing to occur.

Less apparent inverse stratification occurs under the ice in the winter months. Most of the water column is denser than the super-cooled, lighter water just below the ice. The ice also prevents wind-generated currents. As the weather warms, the ice melts and the surface water heats up, therefore decreasing in density. When the temperature/density of the surface water equals the bottom water, very little wind energy can completely mix the lake again (spring turnover). Meteorological conditions affect the timing of lake mixing and stratification with significant implications to the food web and seasonal water quality.

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