

Lake and Reservoir Management Client Advisory

Winter Climate Advisory

How does Winter influence Summer in Lakes and Reservoirs?

We have experienced some “aberrant” weather patterns the past several years....and “unusual weather” seems to be becoming the “norm”. During the Fall, Winter, Spring and early Summer of 2001-2002 drought conditions were experienced in the Northeastern US. By contrast, 2003 conditions were wet, with higher than average rainfall-runoff. Few “heat waves” were experienced during the Summer of 2004, with some of the warmest temperatures experienced in April and May. However, summer stratification in the lake extended through September and into October; a prolonged stratification period. In 2005, stratification developed later than usual, with very weak stratification at the end of May. Stratification developed abruptly, and was very strong during June to September. Stratification persisted even longer than it did during 2004, with summer-like weather well into October. Weather patterns during the summer of 2006 were similar to 2005. However, heat waves were more intense and of longer duration (especially July-August). 2006 was the warmest year on record! Recently Fall-Winter weather patterns have also been aberrant. (We have experienced very little winter weather – *there are implications for lake conditions*).

“Aberrant weather patterns seem to be becoming the norm. Average temperature and average annual rainfall are the becoming “averages of extremes”. When it rains...it pours. When it’s hot...it’s hot.”

“How much algae grows” tends to be controlled by phosphorus availability in most lakes. “What kind of algae grows” tends to be controlled by other factors such as the availability of silica, nitrate, and stratification intensity. Silica and nitrate were exhausted early in the summer of 2006 in many productive lakes, creating conditions that favored nitrogen-fixing bluegreen algae over diatoms and green algae. That exhaustion of the “other nutrients” needed by non-nuisance diatoms and green algae occurred very early, resulting in more intense dominance by N-fixing bluegreen algae (e.g. *Anabaena*) in many lakes and reservoirs. Weather patterns during December-April set the stage for the abundance of phytoplankton the following growing season and, more importantly, what kind of algae is dominant. Winters that are unusually mild, with short, weak ice-cover, result in greater carry-over of phosphorus from the previous Fall, and early exhaustion of available nitrate-N and silica. The growing season and stratification starts early. The “stage is set” for greater abundance of nuisance nitrogen-fixing bluegreen algae the following summer (especially if the stratification season extends into October). Whether this is long-term “climate change” is debatable. However, it is becoming clear that there is an influence over summer conditions in Lakes and Water Supply Reservoirs and we need to anticipate management needs to avoid water quality and supply treatment problems.



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