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Filamentous Green Algae Bloom in Upper Oak Creek

An investigation was conducted on April 16, 2008 on a reported algae bloom in the upper reaches of Oak Creek. The bloom extended from the confluence of Pumphouse Wash downstream for approximately four kilometers

Taxonomic classification identified the algae as primarily *Ulothrix sp.* intermingled with lesser amounts of *Stigeoclonium sp.* Both of theses alga are green algae (Chlorophyta) and are not the blue-green (Cyanophyta) as originally reported. Ulothrix is found in springs, creeks and rivers forming bright green masses that are attached to cobble in flowing water. The algae was observed in small patches above Sterling Springs Hatchery, no algae was seen from the hatchery discharge to just above the confluence with Pumphouse Wash, where it was spotty until below Pumphouse Wash when the algae carpeted the substrate with streaming filaments up to one meters in length. In this area Oak Creek emerges from a narrow canopied canyon into a more open area exposed to sunlight. The water flow in Oak Creek has been decreasing as evidenced by the dried algae exposed along the creek bank.

Ulothrix is known to respond to nutrient enrichment and show a rapid increase in biomass. Because Sterling Springs Hatchery is located upstream of the algae bloom nutrient samples were collected from the outflow. Analysis revealed that the level of nitrates and phosphates discharged from the hatchery are of little consequence and too low to support such an extensive growth of algae. In fact the nutrient load in the area of the bloom was also very low which may indicates that the algae bloom can no longer be supported and maybe in a downward cycle.

However, the question remains as to the source of the nutrients that caused the bloom to occur in the first place. A significant amount of nitrogen accumulates on the landscape can come from both wet and dry atmospheric deposition. The literature suggests that atmospheric deposition of nitrogen can accumulate at a rate of two to twelve pounds per acre. Therefore, snow on the watershed is not only a reservoir for water but also acts as a reservoir for nitrogen. Forested lands are typically very stingy with nutrients because trees and undergrowth soak up almost all available nitrates. Nitrates that do escape from forested lands typically do so in the winter and early spring when there is little biological activity. A large accumulation of snow on the ground will contain a large amount of nitrogen which is released when the snow melts. The snow pack in the Flagstaff area was more than double the thirty year average at 204 percent. The winter of 2007/2008 delivered a substantial amount of nitrates to Oak Creek.

Ulothrix is a cold water species that is more abundant and grows very well at colder temperatures. This allows *Ulothrix* to take advantage of the nitrogen in the snow melt in the early spring when other plants are still dormant. As the season moves from spring to summer the combined effect of rising water temperatures and increasing day length causes progressively more filaments of *Ulothrix* to switch from vegetative growth to zoospore production resulting in increasing loss of biomass. Therefore, when the water temperatures increase *Ulothrix* will become as noticeable absent in the summer as it was noticeable present in the spring.

We will continue to collect data from the area as the summer progresses.