Lake and pond management is rife with challenges concerning submersed weed and algae control. Weed and algae control are often the most substantial part of managing a pond, especially when it comes to diagnosing and eliminating them in the best interest of the pond owner. Most times pond owners just want the weeds and algae gone – “out of sight, out of mind!” But will simply using copper sulfate be the end of the treatment process for algal blooms? In order to achieve long terms results the source of the problem must be controlled. If the nutrients that fuel algae growth can be minimized, will future blooms in frequency decrease? Another saying comes to mind, “an ounce of prevention is worth a pound of cure.”

**What are Nutrients?**

Nutrients are ever present in lakes and pond systems and are the food source for plants and algae. Carbon, nitrogen, phos-
phorus, and silicon are some of the major nutrients that limit the presence and/or potential of algal cell formation. The more nutrients present in the pond, the more algal one can expect to see. There are also a handful of important micronutrients, like manganese and zinc that play a role. However the macronutrient phosphorus most clearly supports algal productivity. Since phosphorus is most often the limiting nutrient, meaning that algal growth is consuming all of the available phosphorus, it is the nutrient over which pond managers can gain significant control. Once the source of the phosphorus is detected, great improvements can be made through various methods of preventive management.

**Where Do Nutrients Come From?**

Nutrients naturally occur in ponds from the day they are filled with water. Depending on the geology of the area, soils will contribute a certain portion of the internal nutrients to the water, especially if they are rich in phosphorus. Fish and waterfowl waste, decomposing vegetation, and decaying aquatic organisms are other examples of internal contributors of phosphorus. As aquatic weeds and algae slowly decompose, they release the phosphorus back into the water. External sources of phosphorus include leaf litter, grass clippings, fertilizer runoff, and even well water and rain. Yard waste and other organic debris that make their way into the lake will also release nutrients as they break down.

Whether they come from within or without, nutrients such as phosphorus are food for aquatic plants and algae. Submersed, emergent, and floating weeds alike all thrive on phosphorus. Ponds with heavy populations of submersed weeds generally contain less algae because the macrophytes are utilizing most of the available phosphorus. However, some ponds are dominated by algae growth and will have thick, floating mats of hair-like filamentous algae or the pea-green soup appearance from planktonic algae. Many ponds contain both varieties and both decrease water clarity, leading to complaints from pond owners.

**Even Phosphorus is Beneficial in Moderation**

It is important to remember that nutrients are an essential piece of the complex web of life that resides in and around every lake and pond. Kept in check and without excessive outside influences, most Florida ponds maintain a phosphorus level that supports a beneficial algal population and a healthy fishery. Algae aren’t all bad. In fact, they are the number one producer of dissolved oxygen in most ponds. However, when nutrients increase dramatically, water clarity can decrease just as dramatically. Heavy nutrient loads are, by definition, the reason ponds begin the eutrophication process. Eutrophic lakes are rich in organic nutrients and undergo large algal blooms.

Regardless of how an algae bloom occurs, pond owners want them gone. Application of a herbicide for submersed plant control or an algaecide (e.g. a copper-containing compound) and applicator know-how will certainly do the trick, but what do herbicides and algaecides do to nutrients in the pond? The short answer is nothing. All things organic will decompose once they die. As the plants and algae begin to decay, they slowly release phosphorus from their cells back into the water as soluble phosphorus, ready to be recycled in the next algae bloom. This decay process plays a significant role in internal nutrient recycling and speaks to the pond management imperative to address not just the symptoms of a nutrient issue, but the source of the nutrients. Although algaecides provide reliable temporary solutions, they are merely a bandage on a more acute, but less obvious, ecological issue.

**How to Get a Handle on Nutrients**

It is apparent that nutrients are creating management issues that can be simple to control, but how are the nutrients controlled? Three primary methods exist.

Physical removal is the most permanent method of nutrient reduction. However, it may be the least feasible due to labor demands, costs and nonselective plant and animal removal. Aquatic weed harvesters can make short order of over-grown submersed weed populations but their use is limited in small ponds. Floating mats of filamentous algae can be raked to shore. Dredging is another effective, albeit drastic and very expensive, approach to removing internal nutrients. By removing layers of muck, years of decayed plant and animal matter can be mitigated.

Animal biomass does contain nutrients. However, the efficiency of such a method in removing nutrients would be similar to harvesting aquatic plants to remove nutrients in that cost and time are extremely prohibitive. Draining the pond would be beneficial in reducing nutrient availability not so much from the aspect of removing nutrients in fish but in oxidizing bottom sediments, firming up substrate and rejuvenating aquatic plant habitat.

The third method of nutrient reduction is nutrient binding. Binding nutrients involves targeting phosphorus specifically with a binding agent known as aluminum sulfate, or alum. Alum is a chemical compound normally used in water treatment facilities in the purification of drinking water. It is also used to clear up turbidity in ponds. Alum can affect the food web and decrease pH of water if applied incorrectly, but alum is regularly used in lakes and ponds for nutrient reduction and water clarification.

**Alum**

Alum has a strong chemical affinity for phosphorus and naturally binds with its soluble form, orthophosphate. The bond between alum and orthophosphate lasts indefinitely. Algal cells can no longer use nutrients when they are bound to alum and no longer have a ready fuel source. As the newly-formed compound settles to the bottom, it gradually creates a thin blanket of alum-bound nutrients that prevents internal nutrient recycling from the sediment at the bottom of the pond. Alum treatments are referred to as sediment deactivation since the bottom of the pond is slowly—or no longer—returning phosphorus into the water. Additionally, because of their positive electrical charge alum molecules stick, or flocculate, to negatively-charged colloidal particles floating in the water, thereby decreasing turbidity and increasing water clarity. Applying alum to a lake or pond is generally a safe way to make soluble phosphorus unavailable for algae growth.

**Nutrient Reduction**

Nutrients are an essential part of aquatic ecosystems in supporting plant, algae, and other aquatic life. Phosphorus is beneficial in terms of biological diversity, dissolved oxygen production, and general pond productivity. However, when there are too many nutrients, they can create a variety of pond management problems. If curtailed, perpetual algae issues can be reduced and algae can remain “out of sight, out of mind!”

**References available from the author.**

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