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AQUATIC VEGETATION PREVENTION

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Many species of aquatic vegetation can over-populate very quickly after entering a fertile body of water (Fig. 1). Ponds are nutrient sinks—a place where incoming nutrients from the watershed accumulate over time. This makes ponds the perfect place for aquatic vegetation to grow, often negatively impacting evaporation rates, recreation, aesthetic value, fish, and wildlife habitat. An aquatic vegetation issue is further amplified because most ponds in Texas are used as livestock watering "tanks," which continuously accumulate nutrients from livestock waste.

Figure 1. Over-populated aquatic vegetation.

Once established, aquatic vegetation can thrive due to its unique adaptations. Most aquatic vegetation species are adapted to tolerate varying environmental conditions caused by water level changes, temperature, sunlight, and nutrient availability. Most species can also reproduce in multiple ways for populations to persist and spread, including seeds, fragments, roots or tubers, and offshoots.

The most cost-effective type of aquatic vegetation management is prevention. Reactive management options are often expensive, involving herbicides and requiring large equipment and technical expertise.

Preventing aquatic vegetation from entering or becoming established in a pond can save time and money in the future. All strategies mentioned in this publication work toward the common goal of limiting aquatic vegetation establishment—primarily through limiting sunlight. Multiple methods should be used when possible.

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Quick Fact: *Drawdowns during colder months (November through March) are sometimes used as a preventative measure by killing over-wintering fragments, roots, or dormant plants. However, drawdowns can worsen issues, particularly with over-wintering seeds or buds stored in the sediment, as seen in duckweed and hydrilla. Regardless, if freezing and dry conditions do not occur, there will be little to no benefit in terms of aquatic vegetation prevention.*

PREVENTING INTRODUCTION

The number one way to prevent an aquatic vegetation infestation is to reduce the possibility of introducing a pond or body of water. Besides reproduction, aquatic vegetation can also spread with other physical means, whether intentional or unintentional.

Domestic animals (e.g., farm dogs) and wildlife can unknowingly transfer vegetation from nearby water bodies in their fur, feathers, antlers, and horns (Fig. 2). Completely eliminating wildlife or domestic animal access may not be feasible or desired. Therefore, physical barriers such as fences or levees are often the best preventative action for animal access—but rarely provide an exclusion from all types of animals such as waterfowl or burrowing animals.

Beyond animals, vegetation may be introduced by human activity. Similar to accidental or intentional fish introductions, bait bucket and aquarium dumping can contribute to aquatic plant establishment. Some of the

Figure 2. A nutria carrying giant salvinia on its fur.

most invasive aquatic plant species in Texas—such as giant salvinia or hydrilla—were initially ornamental or aquarium plants. Additionally, boats, trailers, and other fishing equipment can quickly transfer multiple species of aquatic vegetation. **It is important to never dump a bait bucket or aquarium tank in any body of water. Always properly rinse, drain, and dry equipment between bodies of water.**

POND MAINTENANCE AND CONSTRUCTION

Over time, pond edges can become worn down by rain, wind, and livestock. Eventually, this widens the pond and increases shallow areas where aquatic plants are likely to establish. When constructing or renovating a pond, maintain or deepen the pond edges to 2.5 to 3 feet as quickly as possible (Fig. 3). The slope should be a ratio of 2:1 to 3:1 (in layman's terms: Increase the depth by 1 foot for every 2 to 3 feet toward the center of the pond). This will keep some vegetation from establishing by decreasing pond areas where sunlight can easily reach the pond bottom. The goal is to have the vegetation constricted to a small ring around the pond.

Figure 3. A pond during construction.

To prevent future erosion of pond edges, cattle access can be limited to one area of the pond by using fencing or other barriers (Fig. 4). Limiting access to a single or a few watering points for livestock—and by placing large cobblestones in these access points—may decrease wading time and erosion and reduce the suspension of clay particles and nutrient concentrations. The overall water quality will also improve.

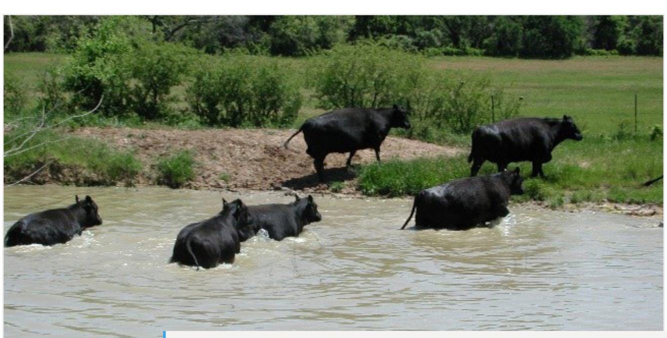

Figure 4. Cattle exiting a limited area of a pond.

TRIPLOID GRASS CARP

Some states recommend that triploid grass carp be stocked proactively at five fish per acre as a biological control for submerged aquatic vegetation, but grass carp stocking laws and permitting issues usually prevent this from being a viable option in Texas. Grass carp are only effective at controlling some floating vegetation species and several, but not all, species of submerged vegetation. Grass carp are generally ineffective at controlling emergent vegetation and algae. However, grass carp are an effective form of control for submerged vegetation for 5 to 7 years, but they usually will not be effective the first year they are stocked, due to eating limitations (Fig. 5).

Quick Fact: *Triploid grass carp should not be stocked proactively in new ponds. It may be several years before there are enough nutrients for the pond to have vegetation, in which case the grass carp will have a limited amount of food, causing starvation.*

Figure 5. Triploid grass carp.

After aquatic vegetation dies back during the winter, they will graze off new vegetation that will begin to grow the following year. Stocking grass carp in a pond with its preferred food sources (e.g., hydrilla, bushy pondweed, American pondweed, and Illinois pondweed) will reduce aquatic vegetation populations the following year.

In Texas, only sterile triploid grass carp can be obtained and stocked with a Texas Parks & Wildlife Department permit. The permit requires the installation of a fish barrier on spillways and overflow pipes to limit grass carp escapes. Contingent on permit approval, 5 to 10 grass carp per acre may be stocked per year. Grass carp are most effective at controlling the preferred species previously listed. However, grass carp can also effectively control other species if its preferred vegetation is absent. Grass carp are not species-selective and will consume non-native species, along with potentially desirable species, a fact which should be considered before stocking.

POND BOTTOM SHADING

Water clarity should ideally be 18 to 24 inches in a pond. This will prevent rooted plants from establishing by limiting the amount of light that reaches the pond bottom, which will constrict plant establishment to the edges of the pond.

A Secchi disk (Fig. 6) measures the overall water clarity by lowering the disk slowly into the water until the disk's white edges cannot be seen clearly and do not appear well-defined. The Secchi disk is then slowly raised until the white disk's edges are seen as clearly defined again. For proper inspection, grab the string at the water line, and while keeping a hand in place, raise the disk out of the water.

Figure 6. Lowering a Secchi disk into a pond.

To get a reading (called a Secchi depth), measure the length of the string from where the water line was to the disk, which will provide a measure of the pond's water clarity or turbidity. There are two methods to increase pond bottom shading and decrease water clarity to the optimal range: Fertilization and pond dyes.

Quick Fact: *A Secchi disk can be made with items commonly found at home, such as a pie pan, gallon paint can lid, or the bottom of a 5-gallon bucket. Drill a hole directly in the center of the disk-shaped item and then paint the entire surface white. Black paint may be added to match the disk pictured in Figure 7, but it is not needed. To add weight, attach a close-fitting bolt through the hole and secure it with a washer and nut. At the head of the bolt, attach a string to complete the disk.*

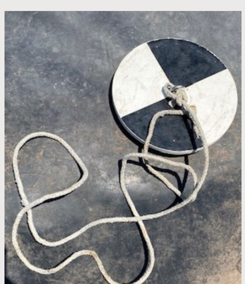

Figure 7. Standard Secchi disk design.

Fertilization

Fertilizing a pond with an inorganic fertilizer that is high in phosphorus can reduce water clarity while also creating a healthy food chain for aquatic organisms. It enhances the natural food chain in the pond by providing food for phytoplankton, which also increase dissolved oxygen. Phytoplankton are the green, single-celled floating algae that give pond water a light-green color.

Initial applications should begin in early April, with smaller applications through September as needed. Ponds should not be fertilized if aquatic vegetation is already established as it will worsen the issue. Any aquatic vegetation present will need to be chemically treated with a herbicide before the fertilization application. It is essential to start fertilization slowly. Do not over-fertilize. If ponds are over-fertilized to the point that water clarity is less than 18 inches, emergency aeration may be required—especially during nighttime hours when phytoplankton are consuming oxygen, but no photosynthesis is occurring.

Concerning water chemistry: alkalinity, hardness, and calcium should be tested before fertilizing to ensure that the fertilization program is efficient. A pond with very low alkalinity (less than 20 milligrams per liter) requires the addition of agriculture lime before starting the fertilization process. The amount of fertilizer required for a pond will be dependent on its hardness and calcium concentrations. Ponds with low, moderate, and high concentrations of hardness will require low, moderate, and high rates of fertilizer, respectively.

Pond Dyes

The use of pond dyes is another option that limits the amount of light reaching the pond bottom—similar to fertilization. However, dyes can disrupt the pond's food chain by shading out phytoplankton and reducing the zooplankton that fish need as food sources. Dyes should not be used when the pond's goal is to produce good fishing, unless either a supplemental commercial diet or supplemental forage is provided for the fish, which further increases costs.

Many dye colors are available for ponds that may be more aesthetically pleasing than a traditional pond (Fig. 8). Pond dye colors include blues, greens, reds, browns, and even

Figure 8. A pond after being dyed.

black. Large fluctuations in the water column, such as increased inflow or outflow, can limit results from dyes and should be considered.

BACTERIA AND NUTRIENT MANAGEMENT

When aquatic vegetation (particularly algae) is treated and dies, bacteria break down the decaying vegetation and release the nutrients contained in it—including the phosphorus—back into the water. This causes a never-ending feedback loop. In order to prevent algae or other vegetation from establishing or coming back quickly after treatments, there are a few options available to cycle and remove (or bind) the nutrients from the pond.

1. A chemical or bacterial phosphorous binder will bind phosphorous and lock it in an unavailable state so as not to be utilized by algae or rooted vegetation.
2. Sludge-reducing products containing natural bacteria can digest organic material in the pond, which can be a significant source of the nutrients that filamentous algae utilize.
3. Several water column clarifiers containing high-performance liquid bacterial blends can fix or cycle nitrogen and phosphorus.

Other Resources: More information on aquatic vegetation identification and management, along with other publications, can be found at: *https://aquaplant.tamu.edu/* **and:** *https://fisheries.tamu.edu/*.

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