



Pond Weeds and Solutions Packet

Wyoming Co. Soil and Water Conservation District

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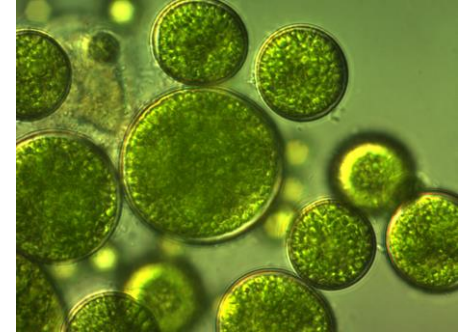
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Algae



Pond algae comes in three main kinds:

Planktonic Algae

Single-celled, microscopic plants, blooms can be bright green, pea soup looking or even a blood red color. They are the base of the food chain, and a healthy existing pond or well prepped new pond must have planktonic algae as a food source.

Filamentous Algae

Typically found at the surface in the form of greenish mats. Filamentous algae in a pond will grow where there are higher levels of calcium and phosphorus. It is common to have this type of algae encouraged after ponds are limed to enhance fish production. Filamentous pond algae typically are of little or no value to your pond.

Attached-Erect Algae

Attached-erect pond algae are non-rooted but dense. It typically has a gritty and bristly texture and is not much use to the overall pond health. Blue-Green algae is often the biggest culprit when it comes to “pond scum” problems. Blue-green algae are nitrogen-fixing organisms and only need nitrogen and carbon dioxide to live, both very prevalent in most ponds. When there is a blue-green algae bloom, it forms dense masses on the surface of the pond and can cover the entire body of water. Blue-green algae can be toxic to animals and humans.

Filamentous Algae

Description: Has long visible chains, the appearance of wet wool, attaches to rocks and other plants.

Management:

- Physically raked out
- Use of nontoxic dyes (eg. Aquashade, Blue Springs, Crystal Blue)
- Herbicides:
 - Copper Based Compounds (eg. Copper Sulfate)
 - Diquat- Contact Herbicide
 - Alkylamine Salts of Endothall- Contact Herbicide
 - Flumioxazin- is a water dispersible granule that is to be sprayed or injected after mixing. It is a broad spectrum, contact herbicide.

*****Note:** All herbicides can be damaging if used above the recommended dosage & without proper testing of the water's acidity and hardness.



One danger with any chemical control method is the chance of an oxygen depletion after the treatment caused by the decomposition of the dead plant material. Oxygen depletion can kill fish in the pond.

Golden Algae

Description: Non-native, microscopic and floating, oval or elliptical shaped single celled alga. Gives water a golden color and causes water oxygen depletion. In large numbers it releases a toxin and causes fish deaths.

Management: Golden algae prefer brackish or slightly saline waters. If pond water can be maintained fresh either through the addition of well or surface water then golden algae growth may be suppressed or eliminated (not ideal).

- Non-toxic dyes or colorants- dies (eg. Aquashade, Blue Springs, Crystal Blue)

Herbicides-

- Copper Based Compounds (Rated: Excellent)
- Sodium Carbonate Peroxihydrate (Rated: Good)
- Potassium Permanganate (Rated: Excellent)
- Ammonium Sulfate (Rated: Good)

*Key is to treat water before the algae is large enough to become toxic; toxicity remains even after algae has been killed until diluted.

*****Note: All herbicides can be damaging if used above proper dosage & without proper testing of the water's acidity and hardness.



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Chara/ Muskgrass

Description: Can have a foul, musty, and garlicky odor. Gray-green multibranched algae that is commonly mistaken for a submerged flowering plant (no flower). Will not extend above the water's surface, has a "grainy" texture and has cylindrical, whorled branches with 6-16 branchlets around each node.
*Consumed by many ducks.

Management: Can be physically raked and removed, but is difficult to maintain because fragments and spores will regrow.

- Non-toxic dyes or colorants- dyes (eg. Aquashade, Blue Springs, Crystal Blue)
- *Grass carp* will consume Muskgrass- stocking rates to control Muskgrass are usually in the range of 7 to 15 per surface acre.
 - Grass carp will seldom control aquatic vegetation the first year they are stocked. A permit is required
- Herbicides-
 - Copper Based Compounds (Rated: Excellent)- *Copper Sulfate*
 - Alkylamine salts of Endothall (Rated: Good)

*****Note: All herbicides can be damaging if used above the recommended dosage & without proper testing of the water's acidity and hardness.



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Nitella (Stonewarts)

Description: Are branched multicellular algae, have no flower, will not extend beyond water's surface, has no odor and is soft to the touch. Are light to dark green in color with forked, bushy branches 1/16 to 1/8 inches in diameter.

Management:

- Non-toxic dyes or colorants- dyes (eg. Aquashade, Blue Springs, Crystal Blue)
- Physical barriers are also used to eliminate plants by shading the bottom- lake mat, or lake bottom blanket (can be beneficial for swimming area).
- *Grass carp* will consume Nitella- stocking rates to control Nitella are usually in the range of 7 to 15 per surface acre.
 - Grass carp will seldom control aquatic vegetation the first year they are stocked. A permit is required.
- Herbicides-
 - Copper Based Compounds (Rated: Excellent)- *Copper Sulfate*
 - Alkylamine salts of Endothall (Rated: Good)

*****Note: All herbicides can be damaging if used above the recommended dosage & without proper testing of the water's acidity and hardness.

- *One danger with any chemical control method is the chance of an oxygen depletion after the treatment caused by the decomposition of the dead plant material.* Oxygen depletion can kill fish in the pond.

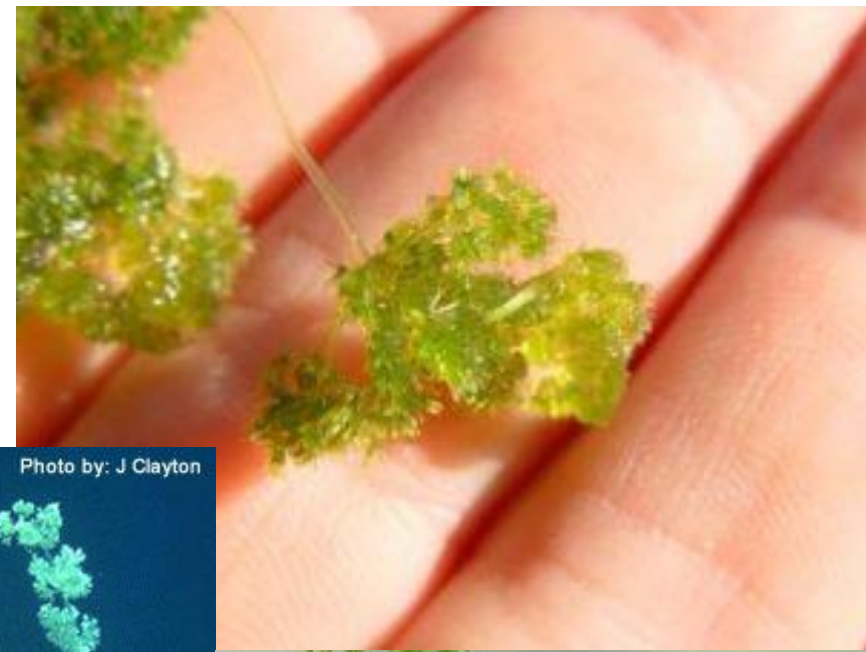


Photo by: J Clayton



Planktonic Algae

Description: Floating microscopic plants, colors pond green, blue-green, brown or variations in between. These are commonly called “algal blooms”. Many species of algae are involved in algae blooms and these species change over time based on temperature, light, nutrients, and other factors.

Management: Cannot be mechanically or physically controlled/removed.

- Non-toxic dyes or colorants- dyes (eg. Aquashade, Blue Springs, Crystal Blue)
- No biological control options
- Herbicides-
 - Copper Based Compounds (Rated: Excellent)- *Copper Sulfate*
 - Alkylamine salts of Endothall (Rated: Good)
 - Sodium Carbonate Peroxy-Hydrate (Rated: Good)

*****Note: All herbicides can be damaging if used above the recommended dosage & without proper testing of the water’s acidity and hardness.

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Green/Blue-Green Algae-Cyanobacteria

Description: Is a photosynthetic bacteria, can be unicellular, filamentous (thin and stringy or hair-like), or in colonies. Will float on surface and can form “scum” or mats, can also be suspended in the water column. Can cause blue, green, or reddish-purple coloration of water.

*Cyanobacteria thrive in warm waters with sunlight, and rich in nutrients (phosphorus and nitrogen).

**Can release cyanotoxins that can be dangerous (deadly) to fish, livestock, pets, and humans. (It is recommended to not allow pets or livestock to drink from ponds).

Management:

- Non-toxic dyes or colorants- dyes (eg. Aquashade, Blue Springs, Crystal Blue)
- No biological control
- Herbicides-
 - Copper Based Compounds (Rated: Excellent)- *Copper Sulfate*
 - Alkylamine salts of Endothall (Rated: Good)
 - Sodium Carbonate Peroxy-Hydrate (Rated: Good)

*****Note: All herbicides can be damaging if used above the recommended dosage & without proper testing of the water’s acidity and hardness.

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Duckweed

Description: An aggressively invasive pond weed often mixed with other algae (Watermeal). Small clusters of 2-5+, round to egg shaped with a slight curvature. If colonies cover the surface, then oxygen depletion and fish kills can occur.

Management:

- Can be physically removed by raking off the water's surface.
- Herbicides-The active ingredients that have been successful in treating duckweed include:
- Carfentrazone (Rated: Excellent)
- Diquat (Rated: Good)
- Fluridone (Rated: Excellent)
- Flumioxazin (Rated: Excellent)
- Penoxsulam (Rated: Excellent)

*****Note: All herbicides can be damaging if used above the recommended dosage & without proper testing of the water's acidity and hardness.

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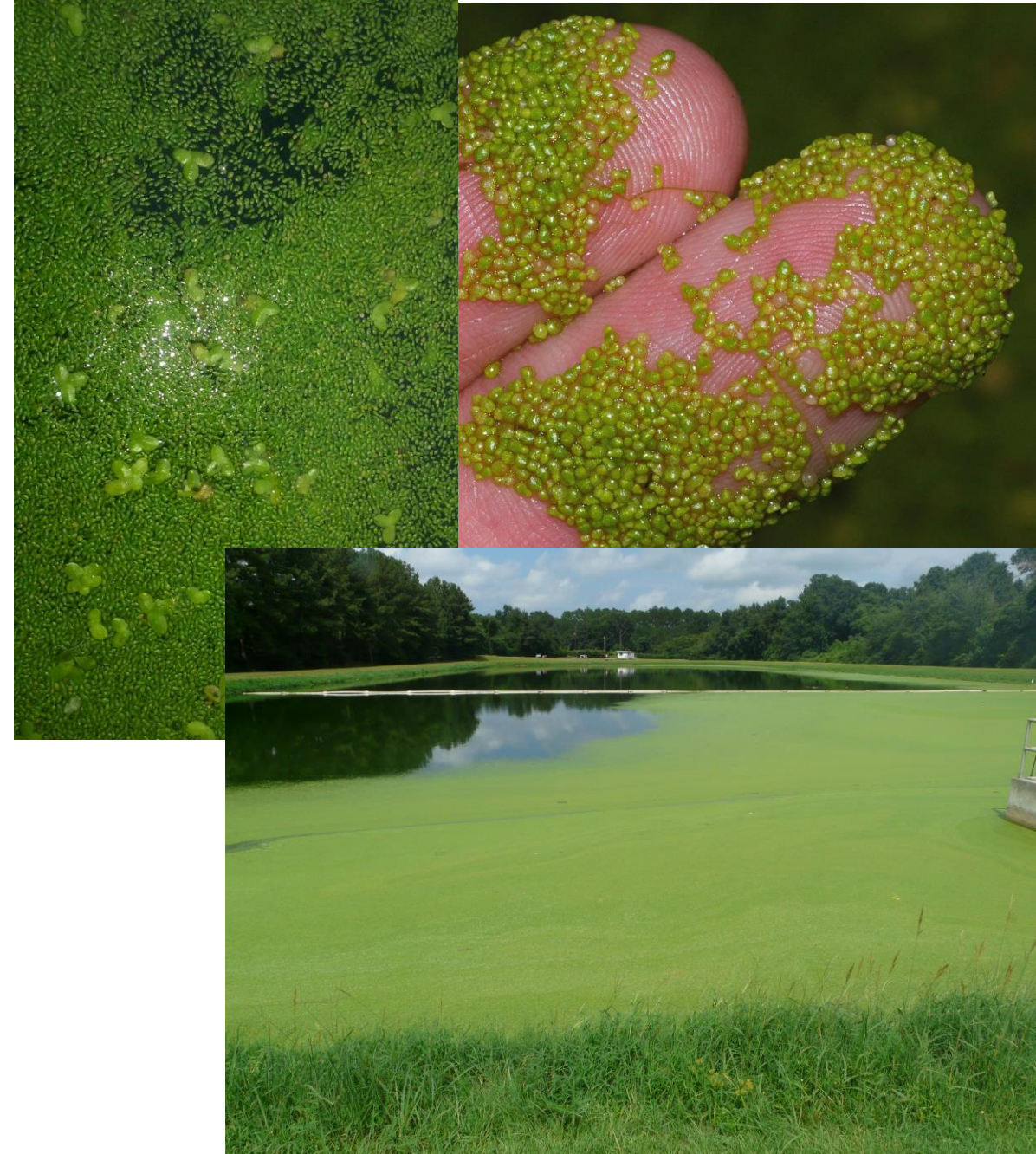


Watermeal

Description: A native but aggressive pond invader often mixed with duckweed and or mosquito fern. If the colonies cover the water's surface then oxygen depletion and fish kill can occur. Watermeal is a rootless, floating plant, barely visible to the naked eye, spherical or oval shaped and (sometimes flattened), and the size of a pinhead.

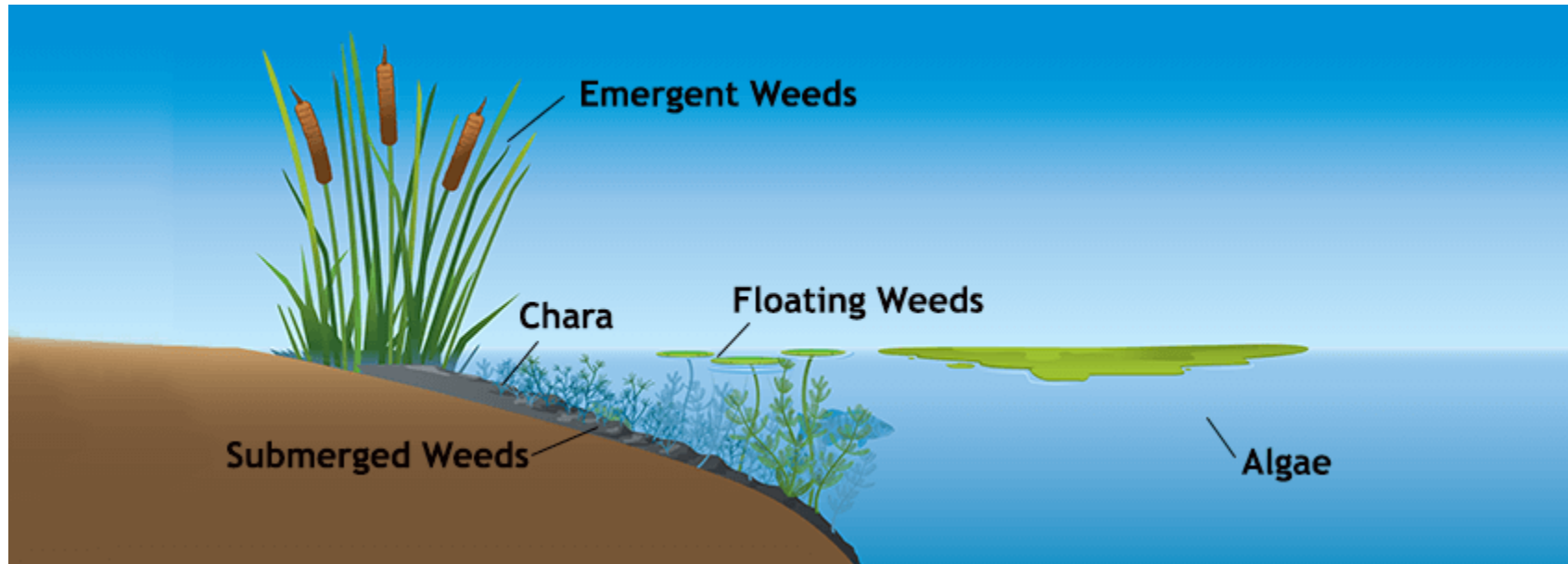
Management:

- Can be physically raked or seined from the pond's surface, but is so small that it is difficult to remove and control.
- Herbicides:
 - The active ingredients that have been successful in treating Watermeal include:
 - Flouridone (Rated: Good)
 - Flumioxazin (Rated: Excellent)
 - Penoxsulam (Rated: Good)
 - *****Note: All herbicides can be damaging if used above the recommended dosage & without proper testing of the water's acidity and hardness.
 - *One danger with any chemical control method is the chance of an oxygen depletion after the treatment caused by the decomposition of the dead plant material. Oxygen depletion can kill fish in the pond.*



Submerged and Floating Weeds

- Submerged plants are rooted plants with flaccid or limp stems and most of their vegetative mass is below the water surface, although small portions may stick above the water.



American Pondweed

Description: Submerged leaves are thin, oval-shaped, 8in long and 1.38in wide. Floating leaves have leather-like texture, long-leaf stalks, elliptical shape, 4.3 in long and 1.75 in wide. Can have a greenish-brown flower that is rounded or elliptical. Is a prominent food source for ducks.

Management:

- Can be physically removed via raking but will regrow from any remaining roots or seeds.
- Non-toxic dyes or colorants- dies (eg. Aquashade, Blue Springs, Crystal Blue)
- *Grass carp* will consume American Pondweed- stocking rates are usually in the range of 7 to 15 per surface acre.

Grass carp will seldom control aquatic vegetation the first year they are stocked. A permit is required.

- **Herbicide Options:** Active ingredients that have been successful in treating this plant include:

- Diquat (Rated: Good)
- Copper Based Compounds (Rated: Good)
- Endothall (Rated: Excellent)
- Fluridone (Rated: Excellent)
- Imazamox (Rated: Excellent)

*****Note: All herbicides can be damaging if used above the recommended dosage & without proper testing of the water's acidity and hardness.

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Baby Pondweed

Description: Is all submerged, linear, light green, and grows in large clumps. Leaves are 2.75 inches & 0.13 inches wide. Is found in neutral or slightly alkaline or brackish water of ponds and rivers. Is an excellent food source for waterfowl.

Management:

- Can be physically removed via raking but will regrow from any remaining roots or seeds.
 - Non-toxic dyes or colorants- dies (eg. Aquashade, Blue Springs, Crystal Blue)
 - *Grass carp* will consume American Pondweed- stocking rates are usually in the range of 7 to 15 per surface acre.
 - Grass carp will seldom control aquatic vegetation the first year they are stocked. A permit is required.
 - Herbicide Options: Active ingredients that have been successful in treating this plant include:
 - Diquat (Rated: Good)
 - Copper Based Compounds (Rated: Good)
 - Endothall (Rated: Excellent)
 - Fluridone (Rated: Excellent)
 - Imazamox (Rated: Excellent)
- *****Note: All herbicides can be damaging if used above the recommended dosage & without proper testing of the water's acidity and hardness.

One danger with any chemical control method is the chance of an oxygen depletion after the treatment caused by the decomposition of the dead plant material. Oxygen depletion can kill fish in the pond.

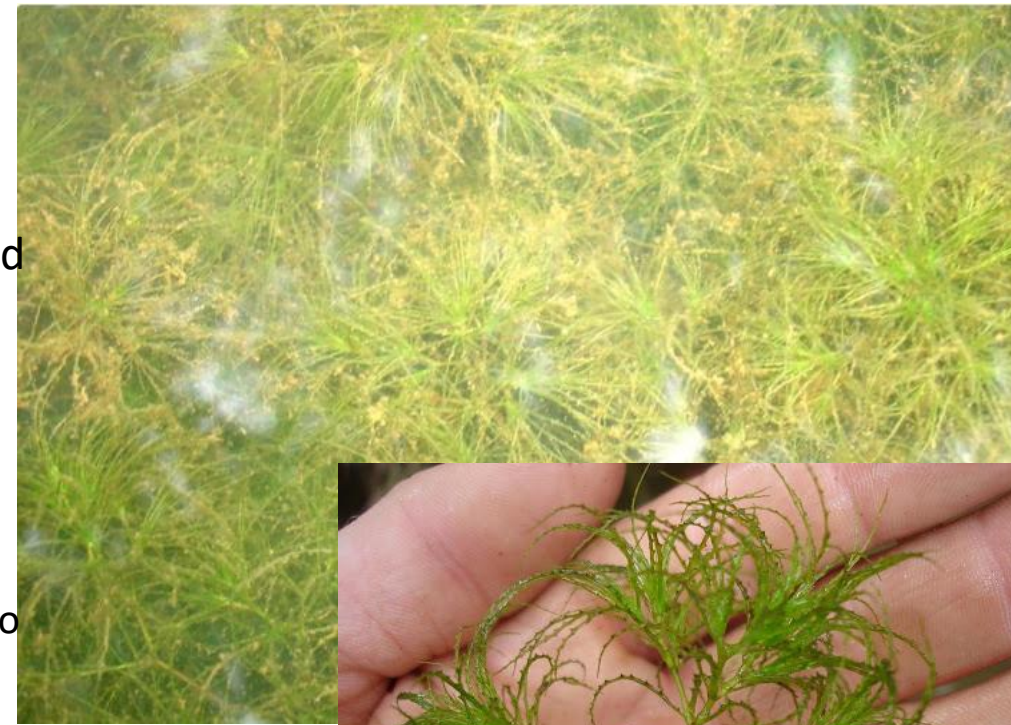


Naiad/ Brittle Naiad

Description: Leaves are brittle, linear, stiff, with toothed edges (1.8 in by 0.13in). Stems are branching and brownish in color. Mostly found in lakes and ponds and is readily consumed by ducks.

Management:

- Can be physically removed via raking but will regrow from any remaining roots or seeds.
- Non-toxic dyes or colorants- dies (eg. Aquashade, Blue Springs, Crystal Blue)
- *Grass carp* will consume Brittle Naiad- stocking rates are usually in the range of 7 to 15 per surface acre.
 - Grass carp will seldom control aquatic vegetation the first year they are stocked. A permit is required.
- **Herbicide Options:** The active ingredients that have been successful in treating brittle naiad include:
 - Copper with Diquat (Rated: Good)
 - Diquat (Rated: Excellent)
 - Endothall (Rated: Excellent)
 - Furidone (Rated: Excellent)
 - Flumioxazin (Rated: Excellent)
 - *******Note:** All herbicides can be damaging if used above the recommended dosage & without proper testing of the water's acidity and hardness.
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Coontail

Description: Leaves are completely underwater (with up to 12 leaves in a whorl), strait and flat, & variable in length of ~0.59in. Stems can be up to 11.4 ft long, branching, brittle, cord like, and forming large masses. Coontail fruits are consumed by ducks.

Management:

- Can be physically removed via raking but will regrow from any remaining roots or seeds.
- Non-toxic dyes or colorants- dies (eg. Aquashade, Blue Springs, Crystal Blue)
- *Grass carp* will consume Coontail- stocking rates are usually in the range of 7 to 15 per surface acre.
 - Grass carp will seldom control aquatic vegetation the first year they are stocked. A permit is required.
- Herbicide Options: The active ingredients that have been successful in treating Coontail include:
 - Copper Complexes (Rated: Good)
 - Diquat (Rated: Excellent)
 - Endothall (Rated: Excellent)
 - Fluridone (Rated: Excellent)
 - Flumioxazin (Rated: Good)
- *****Note: All herbicides can be damaging if used above the recommended dosage & without proper testing of the water's acidity and hardness.
- *One danger with any chemical control method is the chance of an oxygen depletion after the treatment caused by the decomposition of the dead plant material. Oxygen depletion can kill fish in the pond.*



Curly-Leafed Pondweed

Description: Curly-leaved pondweed is a perennial plant that is native to Europe and an aggressive invader in the US. 4 in long leaves are fully submerged and are bright to dark green (& occasionally red) in color. Flowers are spiked, compact and have 3-5 whorls. The stems are simple, branching, 0.02-0.09 in wide and reddish in color.

Management:

- Can be physically removed via raking but will regrow from any remaining roots or seeds.
- Non-toxic dyes or colorants- dies (eg. Aquashade, Blue Springs, Crystal Blue)
- *Grass carp* will consume Curly-Leaved Pondweed- stocking rates are usually in the range of 7 to 15 per surface acre.
 - Grass carp will seldom control aquatic vegetation the first year they are stocked. A permit is required.
- Herbicide Options: Active ingredients that have been successful in treating this plant include:
 - Diquat (Rated: Good)
 - Copper with diquat (Rated: Good)
 - Endothall (Rated: Excellent)
 - Fluridone (Rated: Excellent)
 - Imazamox (Rated: Excellent)
 - Bispyribac (Rated: Good)
 - Flumioxazin (Rated: Good)
 - *****Note: All herbicides can be damaging if used above the recommended dosage & without proper testing of the water's acidity and hardness.
- *One danger with any chemical control method is the chance of an oxygen depletion after the treatment caused by the decomposition of the dead plant material. Oxygen depletion can kill fish in the pond.*

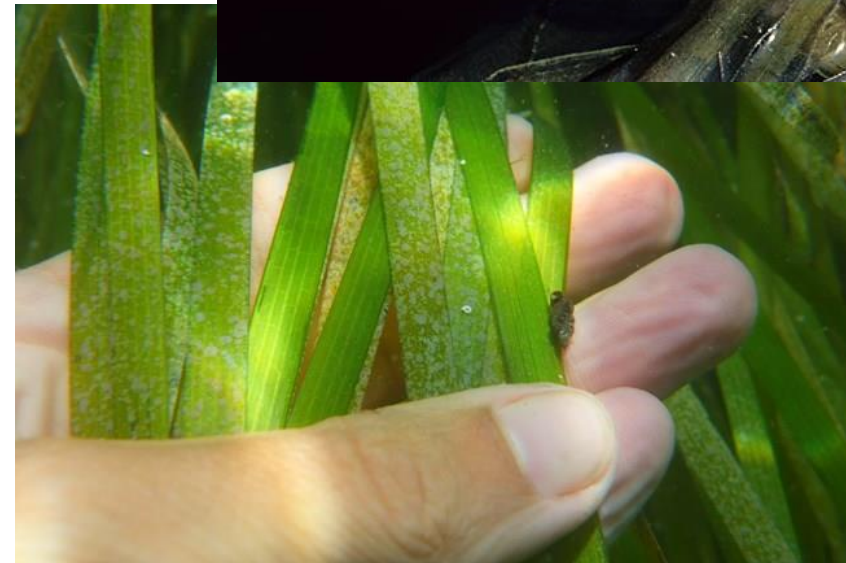
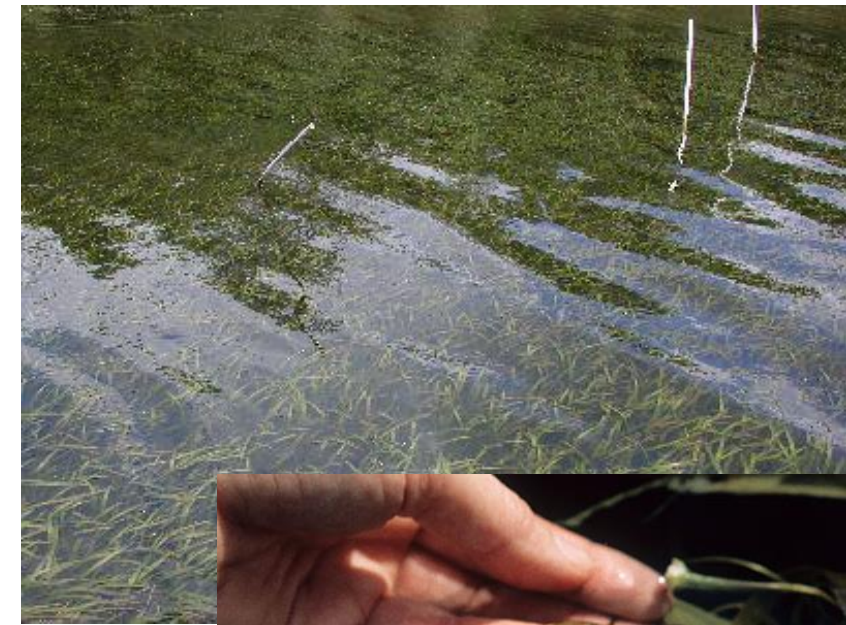


Eelgrass/ Tapegrass/ Wild Celery

Description: Leaves cluster at base, are straight, ribbon like, completely submerged or floating on the water's surface. Leaves can be up to 2 ft long and 0.78 in wide. Flowers can be numerous and float on water's surface. Readily consumed by ducks, waterfowl, and make an excellent habitat for fish.

Management:

- Can be physically removed via raking but will regrow from any remaining roots or seeds.
- Non-toxic dyes or colorants- dies (eg. Aquashade, Blue Springs, Crystal Blue)
- Grass Carp will consume Eelgrass, however, it is not their preferred food source. Stocking rates are usually in the range of 7 to 15 per surface acre.
 - Grass carp will seldom control aquatic vegetation the first year they are stocked. A permit is required.
- Herbicide Control Options: The active ingredients that have been ***somewhat successful*** in treating Eelgrass include:
 - Diquat (Rated: Fair)
 - Endothall (Rated: Fair)
 - *****Note: All herbicides can be damaging if used above the recommended dosage & without proper testing of the water's acidity and hardness.
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Egeria

Description: A non native plant whose stems are straight, cylindrical, and branching with roots on the bottom. Lower leaves are opposite or in whorls of three, while middle leaves are in whorls of 4-6, crowded, straight, and 1.5 in long and 0.2 in wide. Flowers are whitened with three pedal lobes.

Management:

- Can be physically removed via raking but will regrow from any remaining roots or seeds.
 - Non-toxic dyes or colorants- dies (eg. Aquashade, Blue Springs, Crystal Blue)
 - Grass Carp will consume Egeria, however, it is not their preferred food source. Stocking rates are usually in the range of 7 to 15 per surface acre.
 - Grass carp will seldom control aquatic vegetation the first year they are stocked. A permit is required.
 - Herbicides: Active ingredients that have been successful in treating this plant include:
 - Copper Complexes with Diquat (Rated: Excellent)
 - Endothall (Rated: Excellent)
 - Fluridone (Rated: Good)
 - Penoxsulam (Rated: Good)
- *****Note: All herbicides can be damaging if used above the recommended dosage & without proper testing of the water's acidity and hardness.

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Elodea

Description: Commonly confused with Hydrilla and Egeria, Elodea has fairly straight leaves, that gradually get smaller towards the top and have whorls of three. Stems can range anywhere from 2-4 ft.

Management:

- Can be physically removed via raking but will regrow from any remaining roots or seeds.
- Non-toxic dyes or colorants- dies (eg. Aquashade, Blue Springs, Crystal Blue)
- *Grass carp* will consume Elodea, stocking rates are usually in the range of 7 to 15 per surface acre.
 - Grass carp will seldom control aquatic vegetation the first year they are stocked. A permit is required.
- **Herbicides:** Active ingredients that have been successful in treating Elodea include:
 - Copper Complexes (Rated: Good)
 - Diquat (Rated: Excellent)
 - Fluridone (Rated: Excellent)
 - Flumioxazin (Rated: Excellent)
 - Penoxsulam (Rated: Good)

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Images from R.G. Lovell, Alabama Department of Conservation & Natural Resources

Eurasian Watermilfoil

Description: Eurasian Watermilfoil is considered one of the most aggressive and problematic invasive species in the US. It forms in dense colonies, has reddish brown stems that can be up to 8.1ft long, with 3-5 leaves in whorls. Each leaf is finely divided into 9 to 21 pairs of leaflets. Leaves are limp when removed from the water.

Management:

- Can be physically removed via raking but will regrow from any remaining roots or seeds.
- Non-toxic dyes or colorants- dies (eg. Aquashade, Blue Springs, Crystal Blue)
- Herbicides: The active ingredients that have been successful in treating Eurasian watermilfoil include:
 - Bispyribac (Rated: Good)
 - Carfentrazone (Rated: Excellent)
 - Copper Complexes (Rated: Good)
 - Diquat (Rated: Excellent)
 - Endothall (Rated: Excellent)
- *****Note: All herbicides can be damaging if used above the recommended dosage & without proper testing of the water's acidity and hardness.
- *One danger with any chemical control method is the chance of an oxygen depletion after the treatment caused by the decomposition of the dead plant material. Oxygen depletion can kill fish in the pond.*

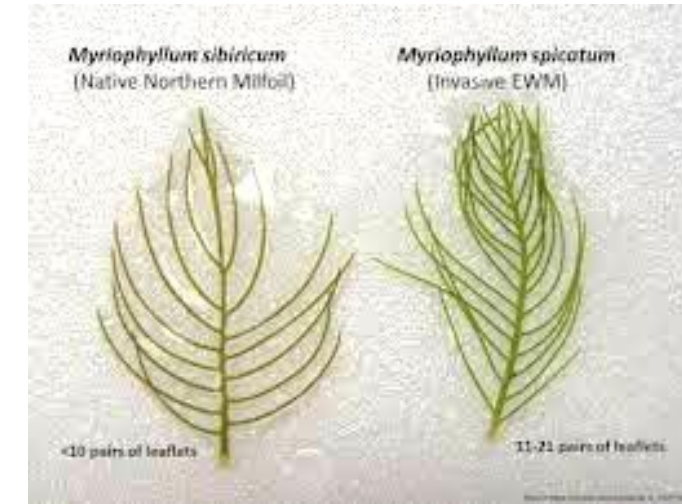


Northern Watermilfoil

Description: Appears nearly identical to the invasive Eurasian Watermilfoil, forms in dense colonies, has reddish brown stems that can be up to 8.1ft long, with 3-5 leaves in whorls. Each leaf is usually has 5 to 9 pairs of leaflets, and the leaves are rigid out of water.

Management:

- Can be physically removed via raking but will regrow from any remaining roots or seeds.
- Non-toxic dyes or colorants- dies (eg. Aquashade, Blue Springs, Crystal Blue)
- Herbicides: The active ingredients that have been successful in treating Eurasian watermilfoil include:
 - Bispyribac (Rated: Good)
 - Carfentrazone (Rated: Excellent)
 - Copper Complexes (Rated: Good)
 - Diquat (Rated: Excellent)
 - Endothall (Rated: Excellent)
- *****Note: All herbicides can be damaging if used above the recommended dosage & without proper testing of the water's acidity and hardness.
- *One danger with any chemical control method is the chance of an oxygen depletion after the treatment caused by the decomposition of the dead plant material. Oxygen depletion can kill fish in the pond.*



Hydrilla

Description: Is an invasive plant species that has pointed, strap like, leaves that grow in whorls of 4-8 and has sharp teeth along the midrib (will feel rough if you rub your hand). The flowers are tiny, white, and grow on a long stalk while the stem is slender, branching, and can be up to 25 ft long. The roots have potato like tubers attached to the ends.

Management:

- Can be physically removed via raking but will regrow from any remaining roots or seeds.
- Non-toxic dyes or colorants- dies (eg. Aquashade, Blue Springs, Crystal Blue)
- Grass Carp will readily consume Hydrilla, as it is one of their preferred food source. Stocking rates are usually in the range of 7 to 15 per surface acre.
 - Grass carp will seldom control aquatic vegetation the first year they are stocked. A permit is required.

Herbicides: The active ingredients that have been successful in treating hydrilla include:

- Bispyribac (Rated: Excellent)
- Copper Complexes (Rated: Good)
- Diquat (Rated: Good)
- Endothall (Rated: Good)
- Fluridone (Rated: Excellent)
- Flumioxazin (Rated: Good)
- Imazamox (Rated: Good)
- Penoxsulam (Rated: Excellent)

*******Note:** All herbicides can be damaging if used above the recommended dosage & without proper testing of the water's acidity and hardness.

One danger with any chemical control method is the chance of an oxygen depletion after the treatment caused by the decomposition of the dead plant material. Oxygen depletion can kill fish in the pond.



Leslie J. Mehrhoff, Univ. of Connecticut, Bugwood.org

Robert Vidéki, Doronicum Kft., Bugwood.org



5396755

Illinois Pondweed

Description: has submerged leaves that are thin, sword shaped, often curved and 8in long by 1.77in wide. Emergent leaves are a leathery texture with a wider leaf. The flower is immobile and oval shaped, while the stem is a cylindrical, simple or branching structure that is spotted with red.

Management:

- Can be physically removed via raking but will regrow from any remaining roots or seeds.
- Non-toxic dyes or colorants- dies (eg. Aquashade, Blue Springs, Crystal Blue)
- Grass Carp will readily consume Illinois Pondweed. Stocking rates are usually in the range of 7 to 15 per surface acre.
 - Grass carp will seldom control aquatic vegetation the first year they are stocked. A permit is required.

Herbicides: Active ingredients that have been successful in treating this plant include:

- Diquat (Rated: Good)
- Copper with diquat (Rated: Good)
- Endothall (Rated: Excellent)
- Fluridone (Rated: Excellent)
- Imazamox (Rated: Excellent)
- Bispyribac (Rated: Good)
- Flumioxazin (Rated: Good)
- Imazapyr (Rated: Good)
- Penoxsulam (Rated: Good)

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Parrotfeather

Description: Is an invasive species that has long, stiff, light green leaves. All leaves are whorled, 0.78-2 in long, and divided into 10 or more linear, threadlike sections. Has a branching stem and a white-pinkish flower.

Management: Management:

- Can be physically removed via raking but will regrow from any remaining roots or seeds.
- Non-toxic dyes or colorants- dies (eg. Aquashade, Blue Springs, Crystal Blue)
- *Grass carp* will consume Parrotfeather, but is not their preferred food. Stocking rates are usually in the range of 7 to 15 per surface acre.
 - Grass carp will seldom control aquatic vegetation the first year they are stocked. A permit is required.

Herbicides: The active ingredients that have been successful in treating parrot's-feather include:

- Diquat (Rated: Excellent)
- Endothall (Rated: Excellent)
- Fluridone (Rated: Excellent)
- Flumioxazin (Rated: Good)
- Imazamox (Rated: Good)
- Imazapyr (Rated: Good)

*****Note: All herbicides can be damaging if used above the recommended dosage & without proper testing of the water's acidity and hardness.

One danger with any chemical control method is the chance of an oxygen depletion after the treatment caused by the decomposition of the dead plant material. Oxygen depletion can kill fish in the pond.



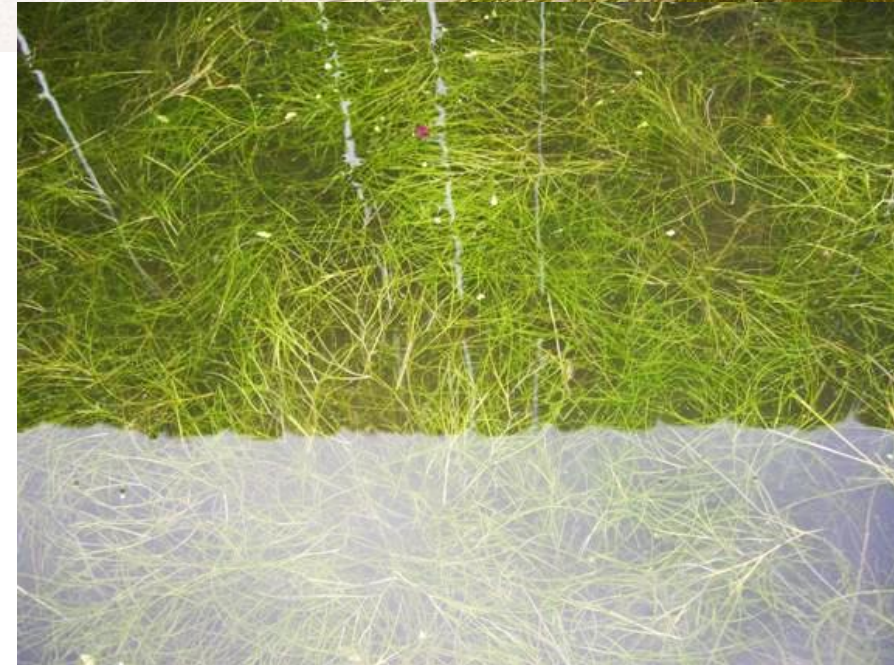
Sago Pondweed

Description: Has fully submerged leaves 6 in long by 0.05 in wide that are thinly linear/ threadlike with strong cross veins. Stem has horizontal stem branching that is ~0.05 in diameter with simple leaves at the base and abundantly branched at the top.

Management:

- Can be physically removed via raking but will regrow from any remaining roots or seeds.
- Non-toxic dyes or colorants- dyes (eg. Aquashade, Blue Springs, Crystal Blue)
- Grass Carp will readily consume Sago Pondweed. Stocking rates are usually in the range of 7 to 15 per surface acre.
 - Grass carp will seldom control aquatic vegetation the first year they are stocked. A permit is required.
- Herbicides: Active ingredients that have been successful in treating this plant include:
 - Diquat (Rated: Good)
 - Copper Based Compounds (Rated: Good)
 - Endothall (Rated: Excellent)
 - Fluridone (Rated: Excellent)
 - Imazamox (Rated: Excellent)
 - Bispyribac (Rated: Good)

*****Note: All herbicides can be damaging if used above the recommended dosage & without proper testing of the water's acidity and hardness.
- *One danger with any chemical control method is the chance of an oxygen depletion after the treatment caused by the decomposition of the dead plant material. Oxygen depletion can kill fish in the pond.*



Southern Naiad/ Bushy Pondweed

Description: Has a slender and branching stem that is about 2 ft long, leaves are linear and range from alternate to opposite of each other. Are ~ 1in x 0.8 in, and gradually gets smaller as they approach the tip (tip usually has 1-2 spines).

Management:

- Can be physically removed via raking but will regrow from any remaining roots or seeds.
- Non-toxic dyes or colorants- dies (eg. Aquashade, Blue Springs, Crystal Blue)
- Grass Carp will readily consume Southern Naiad, as it is one of their preferred food source. Stocking rates are usually in the range of 7 to 15 per surface acre.
 - Grass carp will seldom control aquatic vegetation the first year they are stocked. A permit is required.
- **Herbicides:** The active ingredients that have been successful in treating southern naiad include:
 - Copper with Diquat (Rated: Good)
 - Diquat (Rated: Excellent)
 - Endothall (Rated: Excellent)
 - Fluridone (Rated: Excellent)
 - Flumioxazin (Rated: Excellent)
 - Penoxsulam (Rated: Good)

*****Note: All herbicides can be damaging if used above the recommended dosage & without proper testing of the water's acidity and hardness.
- *One danger with any chemical control method is the chance of an oxygen depletion after the treatment caused by the decomposition of the dead plant material. Oxygen depletion can kill fish in the pond.*



Emergent Pond Weeds

- Emergent weeds are rooted plants that grow along the shoreline and stand above the surface or in shallow areas. A defining characteristic of emergent weeds is the stem, which is most often stiff or firm.



Water Lily

Description: Has fleshy, oval shaped, green leaves (reddish underneath) that float on top of the water. Flowers can be various colors with the most common being white and yellow and are mounded on top of the water as well.

Management:

- Water Lilies can be cut and physically removed, however, they can regrow from seeds and rhizomes.
 - There are no biological controls at this time for water lilies.
 - Herbicides: The active ingredients that have been successful in treating water lily include:
 - 2,4-D (Rated: Excellent)
 - Endothall (Rated: Good)
 - Triclopyr (Rated: Excellent)
 - Glyphosate (Rated: Good)
 - Imazamox (Rated: Good)
 - Fluridone (Rated: Excellent)
 - Penoxsulam (Rated: Good)
- *****Note: All herbicides can be damaging if used above the recommended dosage & without proper testing of the water's acidity and hardness.
- *One danger with any chemical control method is the chance of an oxygen depletion after the treatment caused by the decomposition of the dead plant material. Oxygen depletion can kill fish in the pond.*



Water Willow

Description: The entire plant is a little over 3 feet tall, the leaves are linear and sword shaped (6.29 in long and 0.98 in wide). Stems are simple and upright while the flowers are violet or white in color. Water Willow is a food source for deer, beavers, and nutria.

Management:

- Water Willow can be physically cut or grazed but will reestablish itself from roots and seeds.
- There are no known biological controls.
- Herbicides: The active ingredients that have been successful in treating Water-willow include:
 - Glyphosate (Rated: Excellent)
 - Imazapyr (Rated: Excellent)
 - Triclopyr (Rated: Excellent)
 - 2,4-D (Rated: Excellent)

*****Note: All herbicides can be damaging if used above the recommended dosage & without proper testing of the water's acidity and hardness.

One danger with any chemical control method is the chance of an oxygen depletion after the treatment caused by the decomposition of the dead plant material. Oxygen depletion can kill fish in the pond.



Water Shield/ Dollar Bonnet

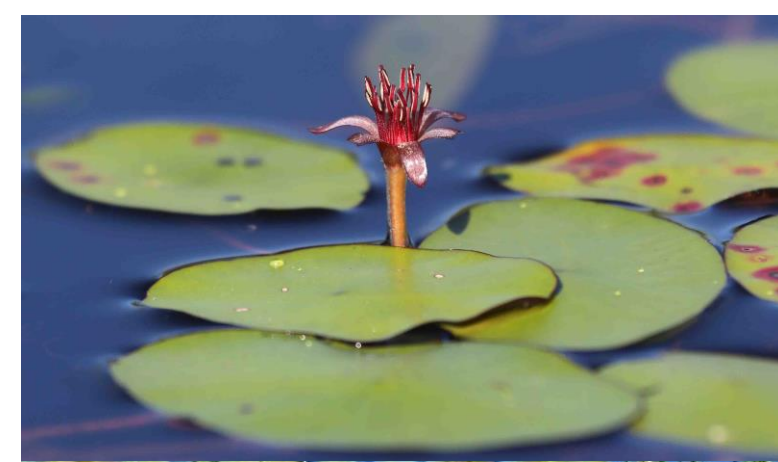
Description: Leaves are shield or oval shaped, smooth on top, jello-like on the bottom, up to 4 in long, and alternate on long leaf stalks. Flowers grow from the axil, are small, dull-purple in color, have 3-4 petals, and are .3-.5 in long. Water shield is consumed by ducks, waterfowl, muskrats, and nutria.

Management:

- Water Shield can be physically cut and removed, roots can be dug up. This can only mildly effective as the plant will reestablish itself from seeds or remaining roots.
- There are no known biological controls.
- Herbicides: The active ingredients that have been successful in treating water shield include:
 - Fluridone (Rated: Good)
 - Flumioxazin (Rated: Good)
 - Glyphosate (Rated: Good)
 - Imazamox (Rated: Good)
 - Imazapyr (Rated: Excellent)
 - 2,4-D (Rated: Excellent)
 - Florpyrauxifen-benzyl

*****Note: All herbicides can be damaging if used above the recommended dosage & without proper testing of the water's acidity and hardness.

One danger with any chemical control method is the chance of an oxygen depletion after the treatment caused by the decomposition of the dead plant material. Oxygen depletion can kill fish in the pond.



Water Primrose

Description: Leaves are oval or sword shaped, up to 6 in long, and are covered on both sides by small, soft hairs. Water Primrose is in flower in all seasons except winter with yellow flowers with 4-5 leaves. The stems are branched, sometimes covered in long hairs, and feel spongy when in water.

Management:

- Can be physically removed by cutting and digging up the roots, however, any remaining seeds or roots will allow reestablishment.
 - There is no known biological control.
 - Herbicides: The active ingredients that have been successful in treating Water Primrose include:
 - Flumioxazin (Rated: Good)
 - Glyphosate (Rated: Excellent)
 - Imazamox (Rated: Excellent)
 - Imazapyr (Rated: Excellent)
 - Triclopyr (Rated: Excellent)
 - 2,4-D (Rated: Excellent)
- *****Note: All herbicides can be damaging if used above the recommended dosage & without proper testing of the water's acidity and hardness.

One danger with any chemical control method is the chance of an oxygen depletion after the treatment caused by the decomposition of the dead plant material. Oxygen depletion can kill fish in the pond.



Water Pennywort

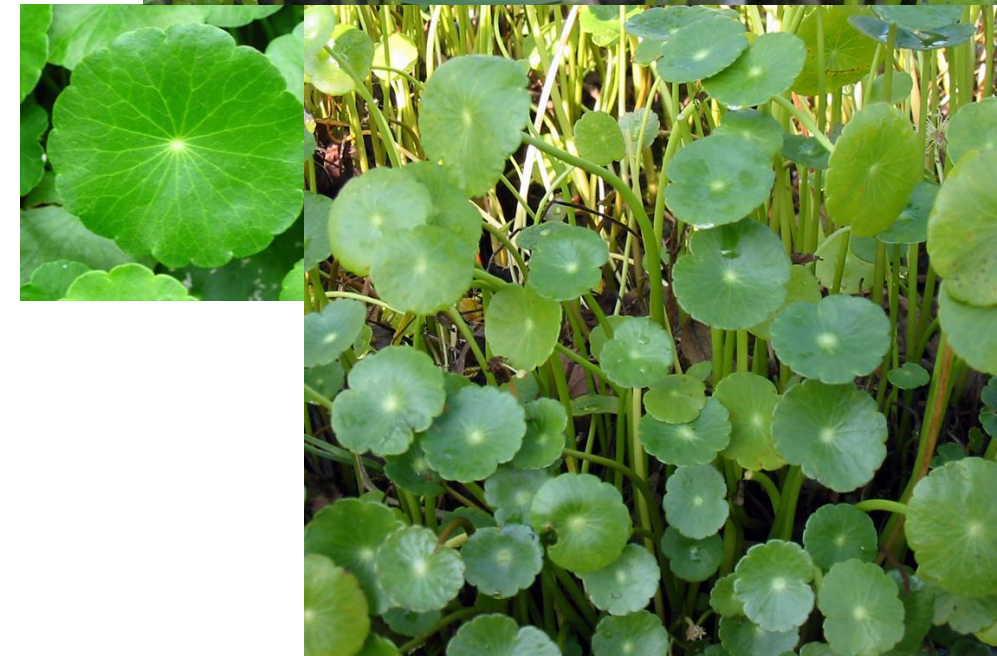
Description: Leaves are circular and about the size of a ½ dollar coin, with a shiny and leathery texture. The leaf stalks attach to the center of the leaf and the stems are slender, creeping, and form dense mats. The Flowers are white, greenish, or yellow.

Management:

- Can be physically removed by cutting and digging up the roots, however, any remaining seeds or roots will allow reestablishment.
- There is no known biological control.
- Herbicides: The active ingredients that have been successful in treating Water Pennywort include:
 - Bispyribac (Rated: Good)
 - Diquat (Rated: Good)
 - Flumioxazin (Rated: Good)
 - Glyphosate (Rated: Good)
 - Imazapyr (Rated: Excellent)
 - Penoxsulam (Rated: Good)
 - Triclopyr (Rated: Excellent)
 - 2,4-D (Rated: Excellent)

*****Note: All herbicides can be damaging if used above the recommended dosage & without proper testing of the water's acidity and hardness.

One danger with any chemical control method is the chance of an oxygen depletion after the treatment caused by the decomposition of the dead plant material. Oxygen depletion can kill fish in the pond.



Waterleaf

Description: Waterleaf has a sturdy and upright stem with leaves 1.19-4.72 in long and 0.2-1.19 in wide. Has showy bright blue and occasionally white flowers with sepals that are shorter than the flower.

Management:

- Can be physically removed by cutting and digging up the roots, however, any remaining seeds or roots will allow reestablishment.
- There is no known biological control.
- Herbicides: The active ingredients that have been successful in treating Waterleaf include:
 - 2,4-D (Rated: Good)
 - Glyphosate (Rated: Excellent)

*****Note: All herbicides can be damaging if used above the recommended dosage & without proper testing of the water's acidity and hardness.

One danger with any chemical control method is the chance of an oxygen depletion after the treatment caused by the decomposition of the dead plant material. Oxygen depletion can kill fish in the pond.



Three Square

Description: Has 3-4 leaves, with well marked, brown scales at the mid-nerve. Has 1-4 spikelets that are immobile, oval or sword shaped, and 0.28-0.67 long and 0.16-0.2 in thick. The stems are hollow, and grow upwards from 0.75- 5 feet long and 0.08-0.23 in thick. Is eaten by ducks, wild geese, and muskrats.

Management:

- Can be physically removed by cutting and digging up the roots, however, any remaining seeds or roots will allow reestablishment.
- There is no known biological control.
- Herbicides: The active ingredients that have been successful in treating Three-Square include:
 - Diquat (Rated: *Good*)
 - Glyphosate (Rated: *Good*)

*****Note: All herbicides can be damaging if used above the recommended dosage & without proper testing of the water's acidity and hardness.

One danger with any chemical control method is the chance of an oxygen depletion after the treatment caused by the decomposition of the dead plant material. Oxygen depletion can kill fish in the pond.



Spike Rush

Description: Spike Rush is composed of bladeless sheaths, with spherical scales arranged in crowded spirals. Has one flower or one cluster of flowers. Ducks, geese, and muskrats all eat spike rush. (There are many different kinds; slender, tall, etc.)

Management:

- Can be physically removed by cutting and digging up the roots, however, any remaining seeds or roots will allow reestablishment.
- There is no known biological control.
- Herbicides: The active ingredients that have been successful in treating Spike Rush include:
 - Diquat (Rated: Good)
 - Fluridone (Rated: Good)

*****Note: All herbicides can be damaging if used above the recommended dosage & without proper testing of the water's acidity and hardness.

One danger with any chemical control method is the chance of an oxygen depletion after the treatment caused by the decomposition of the dead plant material. Oxygen depletion can kill fish in the pond.



Spatterdock/ Cow Lily

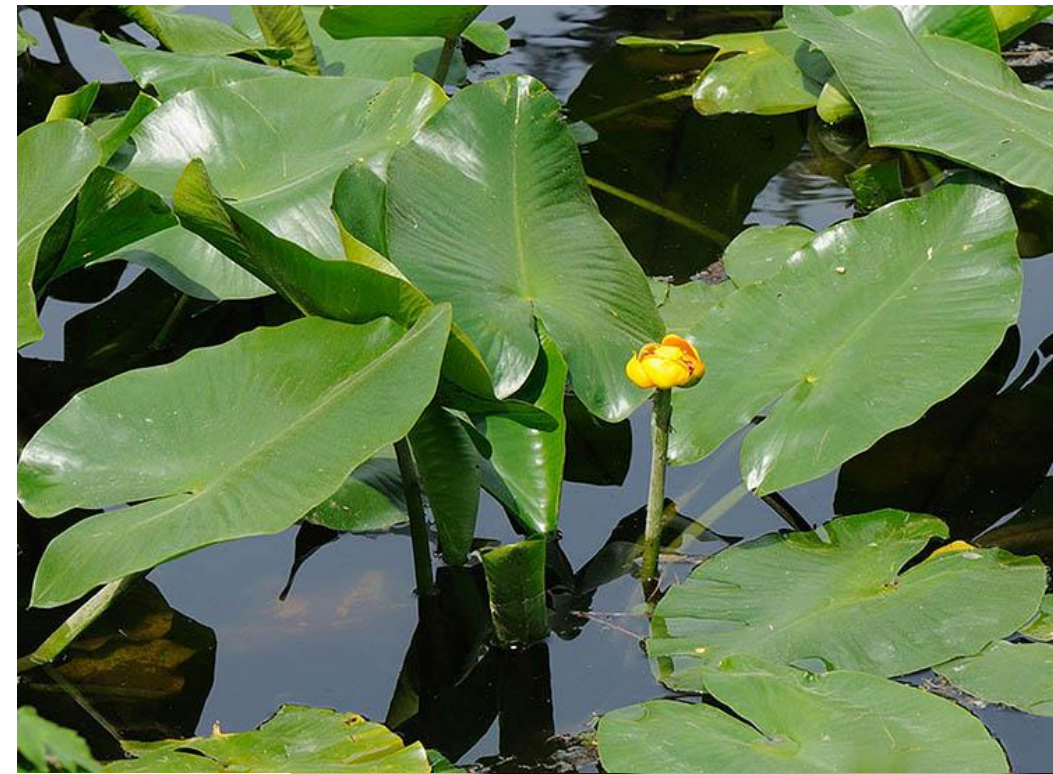
Description: All leaves are arranged in a spiral; the immersed leaves are oval, growing upward, up to 1+ ft long and up to 10 in wide. Submersed leaves are see through, and look similar to floating leaves- leaf stalks are slender and smooth. Flowers can be up to 1 inch long and 1 inch tall, with 6 petals roundish in shape; usually yellow. Commonly grazed on by deer and other wild life.

Management:

- Can be physically removed by cutting and digging up the roots, however, any remaining seeds or roots will allow reestablishment.
- There is no known biological control.
- Herbicides: The active ingredients that have been successful in treating spatterdock include:
 - 2,4-D (Rated: Excellent)
 - Endothall (Rated: Good)
 - Triclopyr (Rated: Excellent)
 - Fluridone (Rated: Excellent)

*****Note: All herbicides can be damaging if used above the recommended dosage & without proper testing of the water's acidity and hardness.

One danger with any chemical control method is the chance of an oxygen depletion after the treatment caused by the decomposition of the dead plant material. Oxygen depletion can kill fish in the pond.



Smartweed

Description: Has alternating, sword shaped leaves, with 1-9 flowers clustering at the ends of the branches. Flowers range in color from white, to green, to pink. Smartweed is heavily consumed by ducks, small birds, and small mammals. There are 15 Smartweed species in N. America.

Management:

- Can be physically removed by cutting and digging up the roots, however, any remaining seeds or roots will allow reestablishment.
- There is no known biological control.
- Herbicides: The active ingredients that have been successful in treating Smartweed include:
 - Bispyribac (Rated: Good)
 - Glyphosate (Rated: Excellent)
 - Imazamox (Rated: Excellent)
 - Imazapyr (Rated: Excellent)
 - Penoxsulam (Rated: Good)
 - Triclopyr (Rated Excellent)
 - 2,4-D (Rated: Excellent)

*****Note: All herbicides can be damaging if used above the recommended dosage & without proper testing of the water's acidity and hardness.

One danger with any chemical control method is the chance of an oxygen depletion after the treatment caused by the decomposition of the dead plant material. Oxygen depletion can kill fish in the pond.



Sedges

Description: Sedges has a hollow stem that ranges from 6in- 4ft tall, has threadlike roots, and flat or folded well developed leaves. Flowers have several spikelets that grow from axils of upper leaves. Spikelets are arranged in a spiral around the axis. Is considered a good wildlife plants consumed by a variety of animals, there are over types of sedges.

Management:

- Can be physically removed by cutting and digging up the roots, however, any remaining seeds or roots will allow reestablishment.
- There is no known biological control.
- Herbicides: The active ingredients that have been most successful in treating sedges include:
 - Glyphosate (Rated: Good)
 - Imazapyr (Rated: Excellent)
 - Penoxsulam (Rated: Good)

*****Note: All herbicides can be damaging if used above the recommended dosage & without proper testing of the water's acidity and hardness.

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Pickerelweed

Description: Has leaves that are deeply heart shaped or cut off at the base. The flowers have a short life cycle, are a straight spike up to 6 inches long, with flowers blue-violet in color. The stems can grow as tall as 3ft, with thick creeping rhizomes rooted in mud. Is consumed by wildlife such as ducks and muskrats.

Management:

- Can be physically removed by cutting and digging up the roots, however, any remaining seeds or roots will allow reestablishment.
- There is no known biological control.
- Herbicides: The active ingredients that have been most successful in treating pickerelweed include:
 - Diquat (Rated: Good)
 - Imazamox (Rated: Excellent)
 - Imazapyr (Rated: Excellent)
 - Tricolpyr (Rated: Good)
 - 2,4-D (Rated: Good)

*****Note: All herbicides can be damaging if used above the recommended dosage & without proper testing of the water's acidity and hardness.

One danger with any chemical control method is the chance of an oxygen depletion after the treatment caused by the decomposition of the dead plant material. Oxygen depletion can kill fish in the pond.



Lizard's Tail

Description: Can grow up to 3ft tall, has heart shaped leaves that are as large as 5.91 in with leaf stalks as long as the blades. The flowers are white and crowded, the spikes are 1 ft long and 0.59 in diameter and is covered in soft white hair. The stems are naked on the bottom and simple and branching on top.

Management:

- Can be physically removed by cutting and digging up the roots, however, any remaining seeds or roots will allow reestablishment.
- There is no known biological control.
- Herbicides: The active ingredients that have been successful in treating lizard's tail include:
 - Diquat (Rated: Good)
 - Glyphosate (Rated: Excellent)
 - 2,4-D (Rated: Good)
- *****Note: All herbicides can be damaging if used above the recommended dosage & without proper testing of the water's acidity and hardness.
- One danger with any chemical control method is the chance of an oxygen depletion after the treatment caused by the decomposition of the dead plant material. Oxygen depletion can kill fish in the pond.



Horsetail

Description: Horsetail has cylindrical sheaths that have black band at the base with the central portion colored whitish-gray to pinkish in color. Sheaths are 0.2-0.47 in in length. The upright stems are evergreen in color, standing alone, has many ridges, and can be up to 9ft tall and 1in in diameter. Branches are similar to primary stems but are smaller in size.

Management:

- Can be physically removed by cutting and digging up the roots, however, any remaining seeds or roots will allow reestablishment.
- There is no known biological control.
- Herbicides: The active ingredients that have been successful in treating Horsetail include:
 - Diquat (Rated: Good)
 - Glyphosate (Rated: Good)
- *****Note: All herbicides can be damaging if used above the recommended dosage & without proper testing of the water's acidity and hardness.
- One danger with any chemical control method is the chance of an oxygen depletion after the treatment caused by the decomposition of the dead plant material. Oxygen depletion can kill fish in the pond.



Giant Reed

Description: Is an invasive species, with firm leaf blades 1-2ft long and 0.78-2+ in wide. The hollow stems can be 6-18 ft tall and up to 2 in thick. They grow upright and are rarely branching. Stems have thick, short rhizomes and grow in large clumps.

Management:

- Can be physically removed by cutting and digging up the roots, however, any remaining seeds or roots will allow reestablishment.
- There is no known biological control.
- Hericides: The active ingredient that has been most successful in treating giant reed include:
 - Glyphosate (Rated: Excellent)
 - Imazamox (Rated: Good)
 - Imazapyr (Rated: Excellent)
- *****Note: All herbicides can be damaging if used above the recommended dosage & without proper testing of the water's acidity and hardness.
- One danger with any chemical control method is the chance of an oxygen depletion after the treatment caused by the decomposition of the dead plant material. Oxygen depletion can kill fish in the pond.



Frog's Bit

Description: Native but aggressive weed with thick, leathery, rounded/ heart shaped leaves. Leaves are bright and shiny on top and reddish and lobed underneath; leaf stalks are firm and have firm ridges. The stem is floating or rooted and the roots are whiteish in color

Management:

- Can be physically removed by cutting and digging up the roots, however, any remaining seeds or roots will allow reestablishment.
- There is no known biological control.
- Herbicides: The active ingredients that have been successful in treating Frog's-Bit include:
 - Bispyribac (Rated: Excellent)
 - Diquat (Rated: Excellent)
 - Flumioxazin (Rated: Good)
 - Imazamox (Rated: Excellent)
 - Imazapyr (Rated: Excellent)
 - Triclopyr (Rated: Excellent)
 - 2,4-D (Rated: Excellent)
- *****Note: All herbicides can be damaging if used above the recommended dosage & without proper testing of the water's acidity and hardness.
- One danger with any chemical control method is the chance of an oxygen depletion after the treatment caused by the decomposition of the dead plant material. Oxygen depletion can kill fish in the pond.



Underside of leaf



Common Reed

Description: Common reed's leaves are flat blades that are 0.39-1.5 in wide. Stems are hollow and can be 3-9 ft tall and 0.29-0.59 in thick. Flowers are loose in branching clusters with spikelets few flowered. Many species of birds utilize common reed for shelter.

Management:

- Can be physically removed by cutting and digging up the roots, however, any remaining seeds or roots will allow reestablishment.
- There is no known biological control.
- Hericides: The active ingredient that has been most successful in treating Common Reed include:
 - Glyphosate (Rated: Excellent)
 - Imazamox (Rated: Good)
 - Imazapyr (Rated: Excellent)
- *****Note: All herbicides can be damaging if used above the recommended dosage & without proper testing of the water's acidity and hardness.
- One danger with any chemical control method is the chance of an oxygen depletion after the treatment caused by the decomposition of the dead plant material. Oxygen depletion can kill fish in the pond.



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Cattail

Description: An aquatic perennial herb, 5 to 6 ft tall from large, creeping rhizomes. Leaves are straight, immobile, linear, and fleshy. The flowers are a long, dense cylindrical spike at the end of the stem. The fruit is a long stalked small nut, and the stem is simple and jointless. There are 3 species of cattails in N. America.

Management:

- Can be physically removed by cutting and digging up the roots, however, any remaining seeds or roots will allow reestablishment. Cutting off the top will not kill them, removing them mechanically can be successful early on, once established, they're difficult to remove.
- There are no available methods for biological control of cattails at this time.
- **Herbicides:** The active ingredients that have been most successful in treating Cattail include:
 - Diquat (Rated: Good)
 - Glyphosate (Rated: Excellent)
 - Imazamox (Rated: Excellent)
 - Imazapyr (Rated: Excellent)
- *******Note:** All herbicides can be damaging if used above the recommended dosage & without proper testing of the water's acidity and hardness.
- One danger with any chemical control method is the chance of an oxygen depletion after the treatment caused by the decomposition of the dead plant material. Oxygen depletion can kill fish in the pond.



© Photo by Green Deane

Buttonbush

Description: A shrub or a small tree, sword shaped leaves opposite of one another that are up to 7.5 in long by 3.75 in wide. Leaves are bright green on top, fleshy and covered in soft hairs on the bottom. Leaves have distinct long veins. Flowers are globular and 0.59 in wide. The stem or trunk can be up to 45 ft high and usually less than 1 ft in diameter.

Management:

- Can be physically removed by cutting and digging up the roots, however, any remaining seeds or roots will allow reestablishment.
- There is no known biological control.
- Herbicides: The only active ingredients that have been successful in treating Buttonbush include:
 - Glyphosate (Rated: Good)
 - Imazapyr (Rated: Good)
- *****Note: All herbicides can be damaging if used above the recommended dosage & without proper testing of the water's acidity and hardness.
- One danger with any chemical control method is the chance of an oxygen depletion after the treatment caused by the decomposition of the dead plant material. Oxygen depletion can kill fish in the pond.



Bulrush

Description: Leaves of Bulrush are either well-developed or reduced blades, leaves also have small leaf-like bracts. The flowers are variable, grow in clusters, range from 50-500 flowers per spike, when the stem is typically hollow and is thicker at the base than near the flower. There are 14 different species of Bulrush in North America.

Management:

- Can be physically removed by cutting and digging up the roots, however, any remaining seeds or roots will allow reestablishment.
- There is no known biological control.
- Herbicides: The active ingredients that have been most successful in treating Bulrush include:
 - Diquat (Rated: Good)
 - Glyphosate (Rated: Excellent)
 - Imazamox (Rated: Excellent)
 - Imazapyr (Rated: Excellent)
- *****Note: All herbicides can be damaging if used above the recommended dosage & without proper testing of the water's acidity and hardness.
- One danger with any chemical control method is the chance of an oxygen depletion after the treatment caused by the decomposition of the dead plant material. Oxygen depletion can kill fish in the pond.



Blue Flag

Description: Leaves of Blue Flag Iris's are green, limp, arched or falling to the ground. Flowers have 3 outer sections of petals, have distinct yellow midrib, and 3 inner sections of petals. The stem is weak, up to 3 ft high, simple or somewhat branching, low arching, and have maturing fruit in the water.

Management:

- Can be physically removed by cutting and digging up the roots, however, any remaining seeds or roots will allow reestablishment.
- There is no known biological control.
- Herbicides: The active ingredients that have been successful in treating blue flag include:
 - Diquat (Rated: Good)
 - Glyphosate (Rated: Excellent)
- *****Note: All herbicides can be damaging if used above the recommended dosage & without proper testing of the water's acidity and hardness.
- One danger with any chemical control method is the chance of an oxygen depletion after the treatment caused by the decomposition of the dead plant material. Oxygen depletion can kill fish in the pond.



Floating Heart

Description: Floating Heart has alternating, floating, leaves with long leaf stalks. The flowers are white or bright yellow in color, the stems are stout and sturdy. Roots are short and clustered. There are four common types or species in North America.

Management:

- Can be physically removed by cutting and digging up the roots, however, any remaining seeds or roots will allow reestablishment.
- There is no known biological control.
- **Herbicides:** The active ingredients that have been successful in treating floating heart include:
 - 2,4-D (Rated: Excellent)
 - Endothall (Rated: Good)
 - Triclopyr (Rated: Excellent)
 - Glyphosate (Rated: Good)
 - Imazamox (Rated: Good)
 - Fluridone (Rated: Excellent)
 - Penoxsulam (Rated: Good)
 - Florpyrauxifen-benzyl
- *******Note:** All herbicides can be damaging if used above the recommended dosage & without proper testing of the water's acidity and hardness.
- One danger with any chemical control method is the chance of an oxygen depletion after the treatment caused by the decomposition of the dead plant material. Oxygen depletion can kill fish in the pond.



Arrowhead/ Bull Tongue

Description: Arrowhead leaves are submersed or immersed, have long leaf stalks, leaves are bladeless, unlobed, or with arrow shaped blades. Plant produces white and rarely pink flowers all summer, has whorls of 3, with 3 sepals and 3 petals. There are nine different species in North America.

Management:

- Can be physically removed by cutting and digging up the roots, however, any remaining seeds or roots will allow reestablishment.
- There is no known biological control.
- Herbicides: Active ingredients that have been successful in treating this plant include:
 - Bispyribac (Rated: Excellent)
 - Flumioxazin (Rated: Good)
 - Glyphosate (Rated: Excellent)
 - Imazamox (Rated: Excellent)
 - Imazapyr (Rated: Excellent)
 - 2,4-D (Rated: Excellent)
- *****Note: All herbicides can be damaging if used above the recommended dosage & without proper testing of the water's acidity and hardness.
- One danger with any chemical control method is the chance of an oxygen depletion after the treatment caused by the decomposition of the dead plant material. Oxygen depletion can kill fish in the pond.



American Lotus

Description: The American Lotus has disk shaped/ centrally shield- shaped leaves that are up to 2.75 ft in diameter. The leaves are floating, center cupped, and have thick peduncles. Each plant has one flower that is pale yellow/ white in color, up to 10 in wide, and has 20+ sepals and petals.

Management:

- Can be physically removed by cutting and digging up the roots, however, any remaining seeds or roots will allow reestablishment.
- There is no known biological control.
- Herbicides: The active ingredients that have been successful in treating American Lotus include:
 - 2,4-D (Rated: Excellent)
 - Endothall (Rated: Good)
 - Triclopyr (Rated: Excellent)
 - Glyphosate (Rated: Good)
 - Imazamox (Rated: Good)
 - Fluridone (Rated: Excellent)
 - Penoxsulam (Rated: Good)
 - Florpyrauxifen-benzyl
- *****Note: All herbicides can be damaging if used above the recommended dosage & without proper testing of the water's acidity and hardness.
- One danger with any chemical control method is the chance of an oxygen depletion after the treatment caused by the decomposition of the dead plant material. Oxygen depletion can kill fish in the pond.



Spotted Water Hemlock

Description: Water Hemlock stands 2-6 ft tall with white flowers resembling Queen Ann's Lace. Sword shaped leaves that are 0.78 -4.72 in long and 0.2-1.19 in wide. The smaller leaves are sharp toothed along the edges. This plant is dangerously **poisonous** at all stages of development and can result in death if ingested. Toxins from the plant's oil can still be absorbed through the skin, extreme caution should be taken.

Management:

**** For management of this plant we recommend that you contact your local authorities such as the DEC for proper identification and safe removal.**



Wild Parsnip:

Looks similar to water hemlock except for being yellow in color. While slightly less toxic, this plant can cause localized burns and rashes if it comes in contact with your skin and is exposed to sunlight.

← THIS PLANT CAN BE SEEN ALL OVER WYOMING CO. IN SUMMER MONTHS!

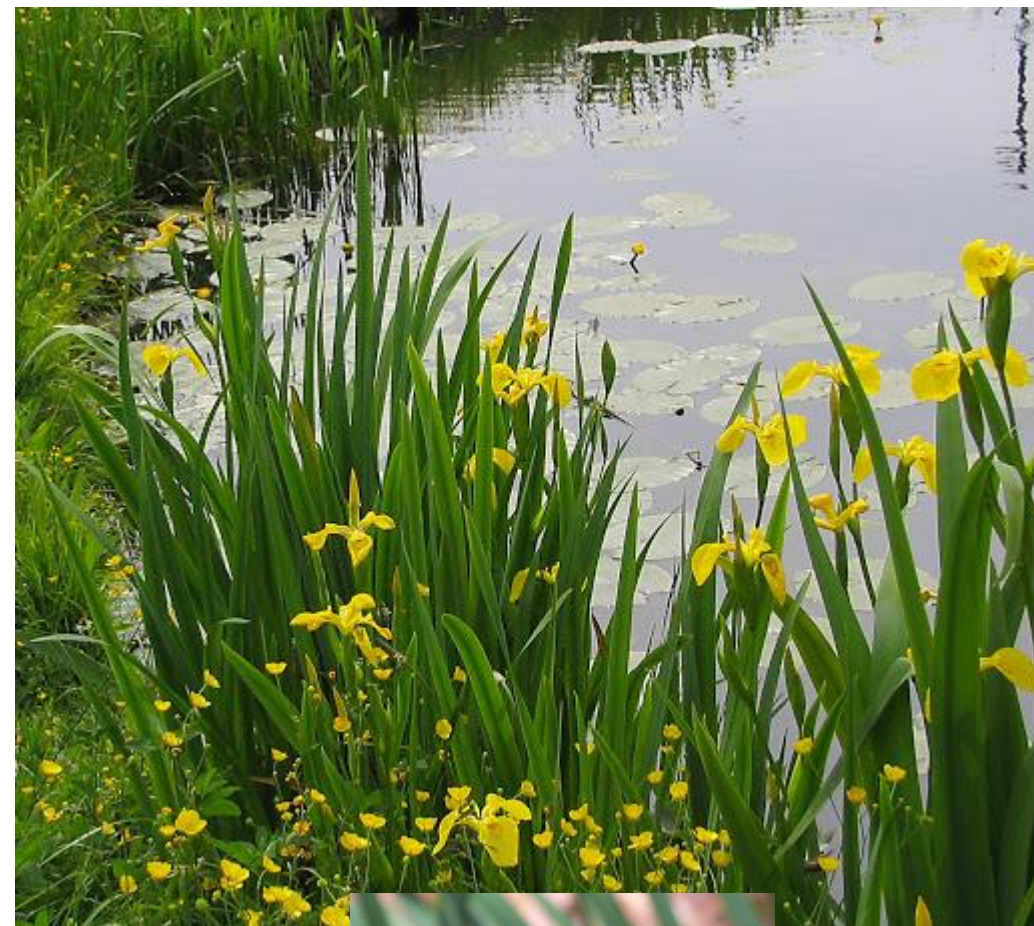


Yellow Flag

Description: Yellow Flag leaves are upright, arching at the top, flat, sword-shaped, pointed, and stand 3-4 ft tall. Flowers are large, showy, yellow and have 3 small petals and 6 large petals. Flower sepals are light brownish-purple in color. Stems are straight, firm, and 3-4 ft tall. Yellow flag is invasive to N. America and can be an aggressive invader.

Management:

- Can be physically removed by cutting and digging up the roots, however, any remaining seeds or roots will allow reestablishment.
- There is no known biological control.
- Herbicides: The active ingredients that have been successful in treating yellow flag include:
 - Diquat (Rated: Good)
 - Glyphosate (Rated: Excellent)
- *****Note: All herbicides can be damaging if used above the recommended dosage & without proper testing of the water's acidity and hardness.
- One danger with any chemical control method is the chance of an oxygen depletion after the treatment caused by the decomposition of the dead plant material. Oxygen depletion can kill fish in the pond.



Water Stargrass

Description: Is a submersed grass-like herb, with thin, ribbon like leaves. Leaves can be up to 6 in long with finely parallel veins with no distinct midvein. 1 flower per plants that is rarely more than 0.78 in long, yellow in color, and exposed above the water. Flower petals are linear or sword-shaped and have 3 stamen. Stems are slender and branching.

Management:

- Can be physically removed via raking but will regrow from any remaining roots or seeds.
- Non-toxic dyes or colorants- dies (eg. Aquashade, Blue Springs, Crystal Blue)
- Grass Carp will consume water stargrass. Stocking rates are usually in the range of 7 to 15 per surface acre.
 - Grass carp will seldom control aquatic vegetation the first year they are stocked. A permit is required.
- **Herbicides:** The active ingredients that have been successful in treating Water Star Grass include:
 - Endothall (Rated: Excellent)
 - Fluridone (Rated: Excellent)
 - Glyphosate (Rated: Good) where it is emergent
 - Imazamox (Rated: Excellent) where it is submerged
 - Penoxsulam (Rated: Excellent)
- *******Note:** All herbicides can be damaging if used above the recommended dosage & without proper testing of the water's acidity and hardness.
- One danger with any chemical control method is the chance of an oxygen depletion after the treatment caused by the decomposition of the dead plant material. Oxygen depletion can kill fish in the pond.



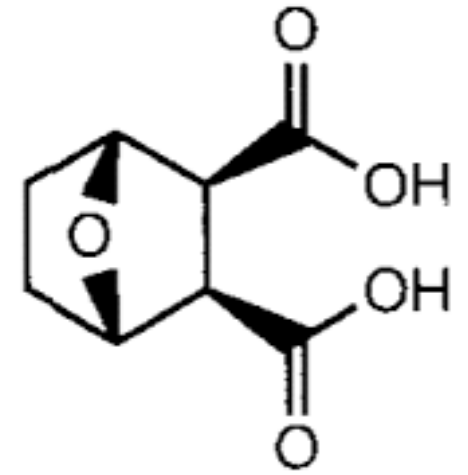
Herbicide Management Information

- Alklamine Salts of Endothall
- Ammonium Sulfate
- Bispyribac
- Carfentrazone
- Copper Based Compounds
- Diquat
- Flumioxazin
- Fluridone
- Glyphosate
- Imazamox
- Imazatyr
- Penoxsalam
- Potassium Permanganate
- Sodium Carbonate Peroxide
- Triclopyr
- 2, 4-D



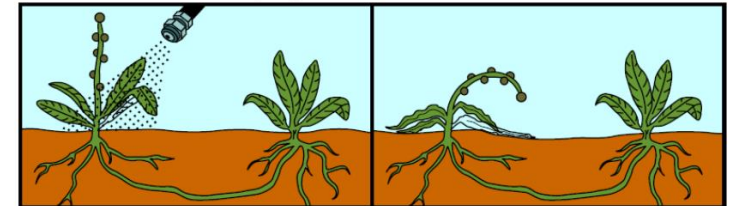
Alkamine Salts of Endothall

- Alkyl amine salts of endothall come in both liquid and granular forms. It is a contact herbicide.
- Common trade and product names include but are not limited to:
 - Hydrothol 191
 - ***Hydrothol can be toxic to fish.***

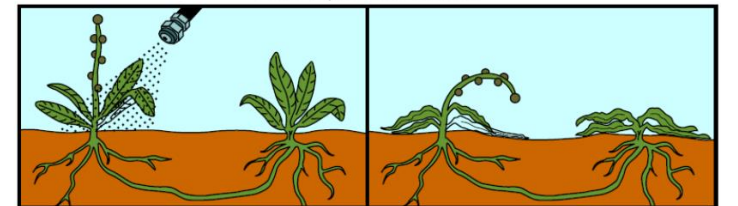


Endothall

CONTACT
Sprayed tissue is killed.

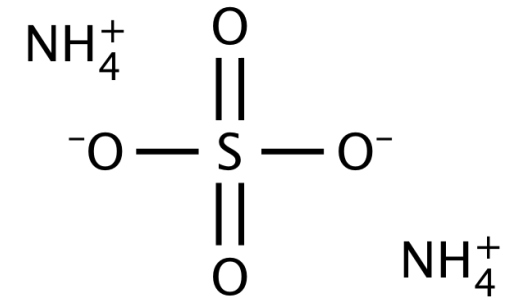


SYSTEMIC
Entire plant is killed.



Ammonium Sulfate

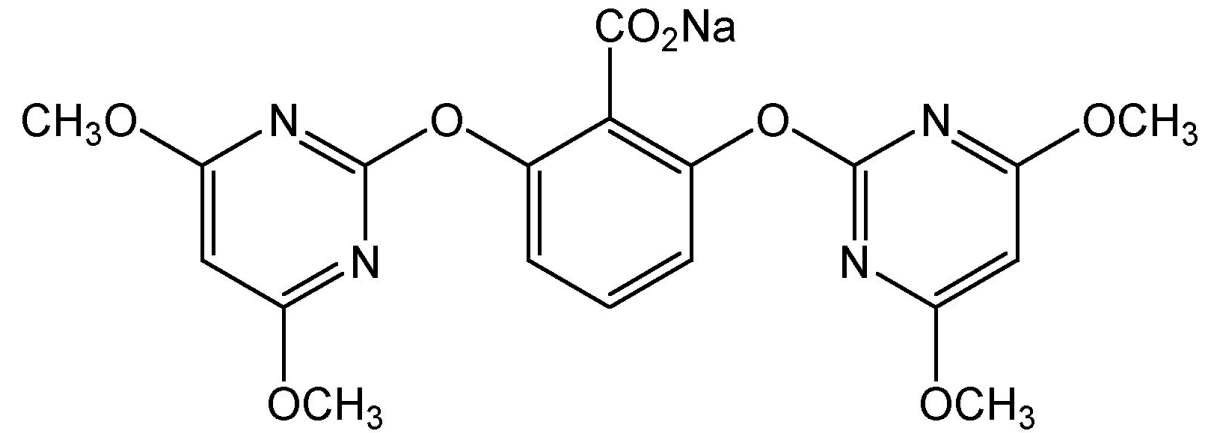
- Ammonium Sulfate is a type of fertilizer, in which the ammonium ion of the compound kills algae (specifically golden algae). This ion is also toxic to fish and other aquatic life. While effective, this compound should be used with real caution to ensure the proper concentration is being used.
- The appropriate concentration has to be calculated of each particular pond and per conditions of the pond immediate before application. Water quality tests for pH, temperature, and ammonia are necessary to calculate the concentration of ammonium sulfate to use.



Bispyribac

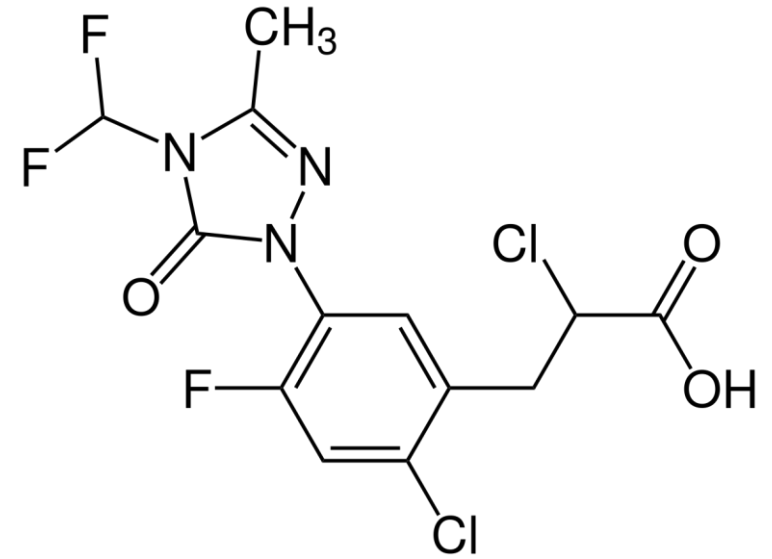
- Bispyribac-sodium comes in water soluble powder form in packets. Each packet should be mixed with water first and then sprayed or injected. It is a selective, systemic herbicide. Systemic Herbicides are absorbed and move within the plant to the site of action. Systemic herbicides tend to act more slowly than contact herbicides. A surfactant (substance that can reduce the surface tension) will be needed if herbicide is applied to foliage of floating or emergent plants. Common trade and product names include but are not limited to:

- Tradewind



Carfentrazone

- Carfentrazone is a contact herbicide that is absorbed through the leaves. Contact herbicides act quickly and kill all plant cells they come in contact with.
- Common trade and product names include but are not limited to:
- Stingray



Copper Based Compounds

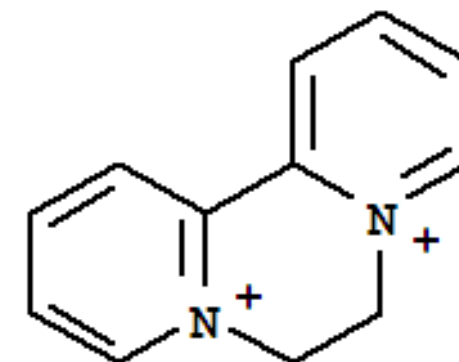
- Copper Sulfate is one of the most popular algal treatments because of its low cost and availability. Copper sulfate can come in several forms depending on the crystal size. This type of algicide can be ineffective for ponds with very hard water, as the calcium in the water will render it ineffective.
- ***All copper compounds can be toxic to fish if used above labeled rates and can be toxic in soft or acidic waters even at label rates.*** Before using copper, it is best to test the pond water's alkalinity and adjust copper treatments to alkalinity concentrations.
- Common trade or product names include but are not limited to:
 - Citrine Plus
 - Crystal Blue
 - Captain
 - Clearigate



Copper Sulfate Powder

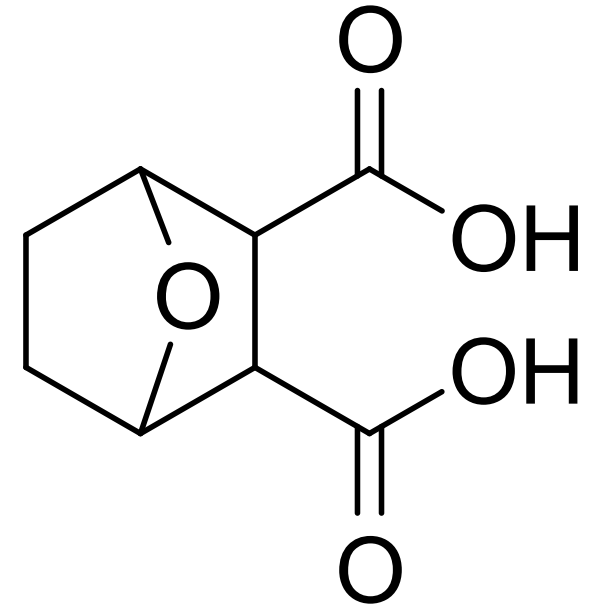
Diquat

- Diquat is another contact herbicide and algaecide. Meaning, that it acts quickly and kills any and all plant cells it comes into contact with. However, rhizomes of the sprayed plant can still support any new growth that didn't get sprayed.
- Common trade or product names include but are not limited to:
 - Reward
 - Tsunami DQ (37.3% Diquat)
 - Harvester
 - Tribune
 - Tsunami DQ
 - Diquat SPC2L
 - Weedtrine



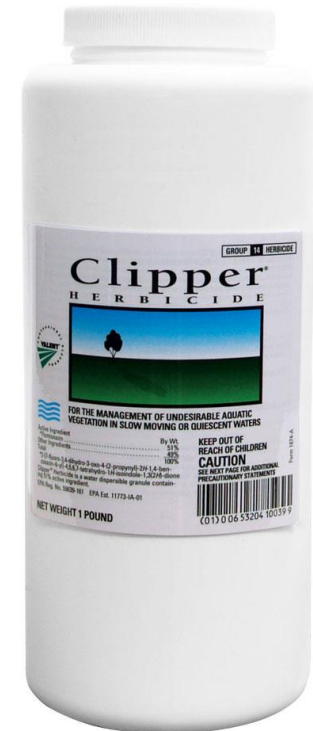
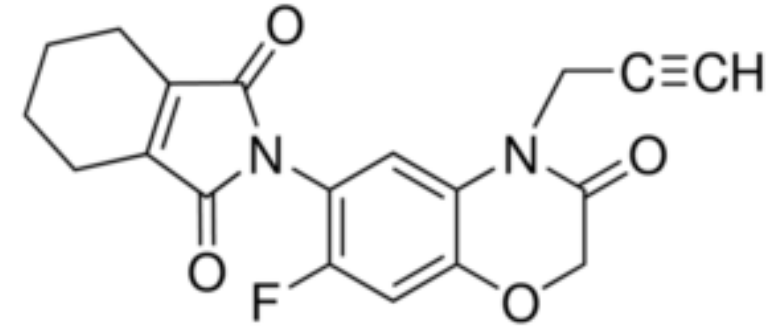
Endothall

- Dipotassium salts of endothall comes in both liquid and granular forms and can be mixed with copper compounds for additional effectiveness. Contact herbicides act quickly and kill plants they come into contact with.
- Common trade and product names include but are not limited to:
 - Aquathol K
 - Aqualthol Super K
- Alkyl amine salts of endothall come in both liquid and granular forms. It is a contact herbicide.
- Common trade and product names include but are not limited to:
 - Hydrothol 191
 - ***Hydrothol can be toxic to fish.***



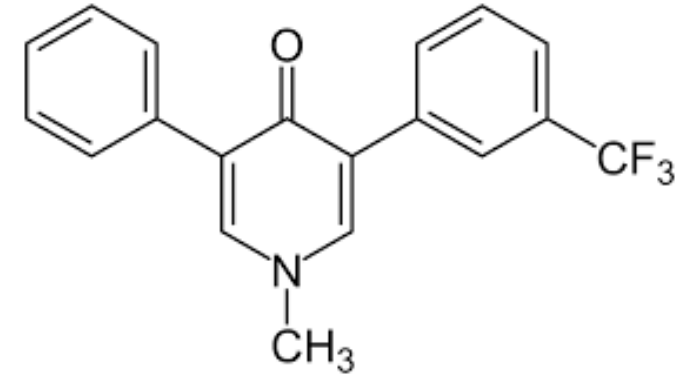
Flumioxazin

- Flumioxazin is a broad spectrum, contact herbicide that can be sprayed or injected. It comes as a dispensable granule that needs to be mixed with water before application. Acting quickly, it should be applied to actively growing plants. For foliage of floating or emergent plants, a surfactant or substance that reduces water tension will be needed. Additionally, the water pH needs to be below 8.5 or flumioxazin will degrade and lose effectiveness.
- Common trade and product names include but are not limited to:
 - Clipper
 - Propeller



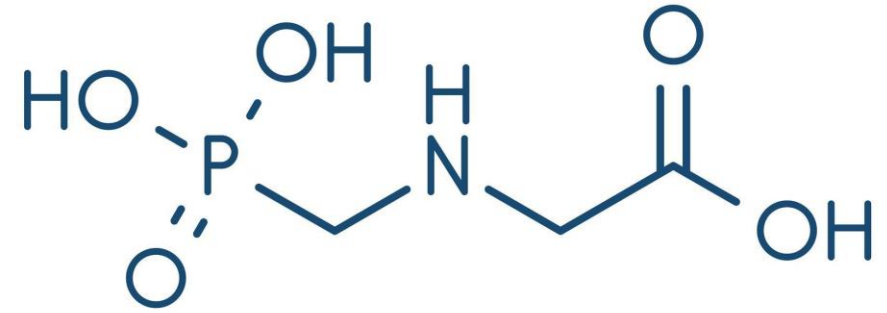
Fluridone

- Fluridone is a broad spectrum, systemic herbicide. Systemic herbicides are absorbed and move within the plant to the site of action. Systemic herbicides tend to act more slowly than contact herbicides.
- Common trade and product names include but are not limited to:
 - Sonar
 - Avast



Glyphosate

- Liquid glyphosate formulations have been effective on water lily. It is a broad spectrum, systemic herbicide. Systemic herbicides are absorbed and move within the plant to the site of action. Systemic herbicides tend to act more slowly than contact herbicides. An aquatically registered surfactant (see the label) will have to be added to the glyphosate solution for good results.
- Common trade or product names include but are not limited to:
 - Rodeo
 - Aquamaster
 - Eraser AQ
 - Touchdown Pro
 - AquaNeat
 - Refuge

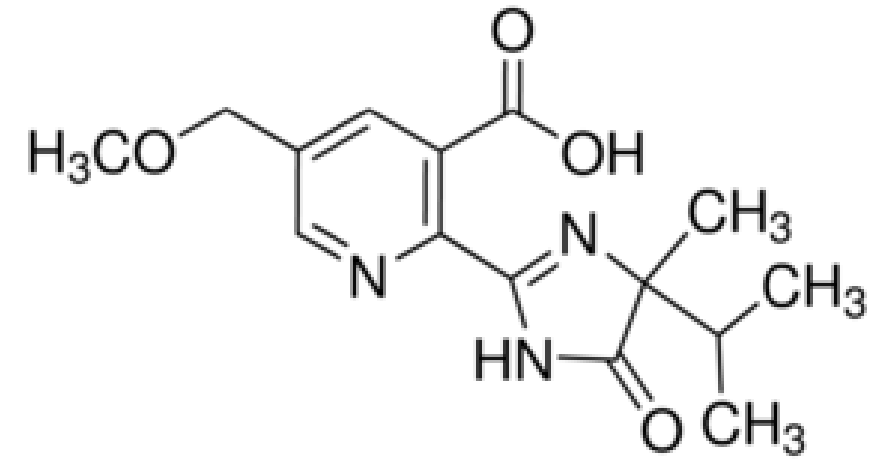


glyphosate

Glyphosate is a very controversial herbicide that has been banned in several countries on the suspected cause of cancer. Use caution when handling with any herbicide. Do your research ahead of time before deciding on the best fit for your needs.

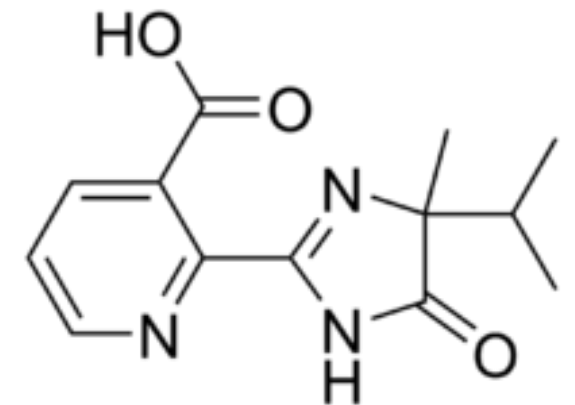
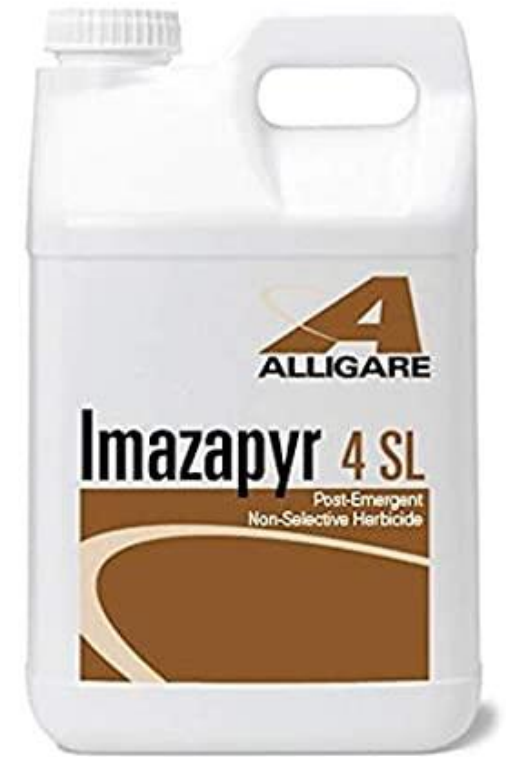
Imazamox

- Imazamox is a broad spectrum, systemic herbicide. Systemic herbicides are absorbed and move within the plant to the site of action. Systemic herbicides tend to act more slowly than contact herbicides. An aquatically registered surfactant (a substance that will release the surface tension) is needed for application.
- Common Trade of product names include but are not limited to:
- Clearcast



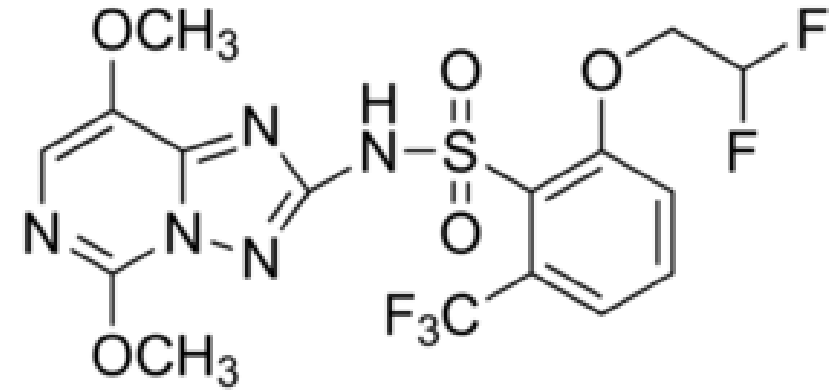
Imazapyr

- The active ingredient, imazapyr, inhibits the plant enzyme AHAS (acetohydroxyacid synthase). Habitat is a systemic herbicide that is effective on post-emergent floating and emergent aquatic vegetation. Imazapyr is effective at low-volume rates and does not contain heavy metals, organochlorides or phosphates, making it safe to humans and livestock. Habitat requires the use of a spray adjuvant when applying on post-emergent vegetation.
- Common trade or product names include but are not limited to:
 - Habitat
 - Arsenal
 - Polaris



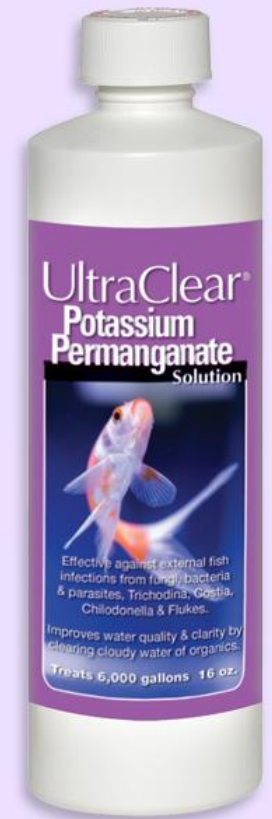
Penoxsulam

- Penoxsulam is a broad spectrum, systemic herbicide. Systemic herbicides are absorbed and move within the plant to the site of action. Systemic herbicides tend to act more slowly than contact herbicides. It may be sprayed directly onto emergent plants or applied directly into the water. Penoxsulam should not be applied in areas where it will be diluted rapidly. This herbicide will need a registered surfactant (see the label) for leaf and exposed sediment applications.
- Common trade and product names include but are not limited to:
- Galleon



Potassium Permanganate

- Potassium permanganate is an oxidizing agent that will kill algae and neutralize its toxins. Potassium Permanganate is usually used at 2 mg/L (higher concentrations may be needed if the water has a high oxidative demand. However, if high concentrations above the oxidative demand are used, it may be harmful to fish and other aquatic life.



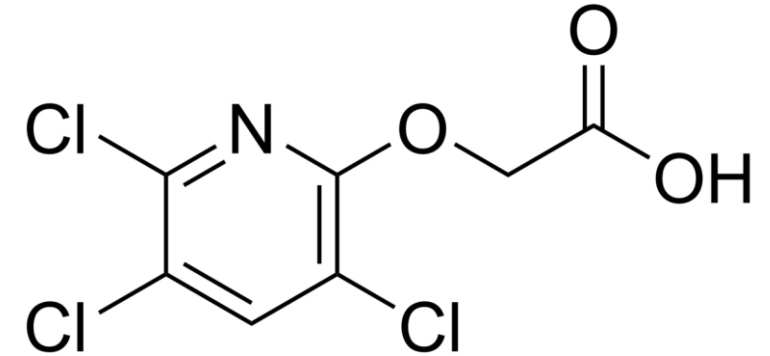
Sodium Carbonate Peroxyhydrate (SCP)

- Sodium Carbonate Peroxyhydrate is a contact herbicide that has been effective in controlling some algae. This has been shown to kill golden algae in particular. With hydrogen peroxide as the active agent, it is not effective in killing the macroalgae like Chara or Nitella. The toxins created by golden algae is not detoxified by this algaecide, caution should still be taken.
- Common trade or product names include:
 - GreenClean
 - PAK27
 - Phycomycin



Triclopyr

- Liquid triclopyr formulation is a selective broadleaf, systemic herbicide. Systemic herbicides are absorbed and move within the plant to the site of action. Systemic herbicides tend to act more slowly than contact herbicides. An aquatically registered surfactant (see the label) will improve the effectiveness of triclopyr.
- Common trade or product names include but are not limited to:
 - Renovate
 - Navitrol
 - Ecotrilopyr



2,4-D

- 2,4-D compounds are systemic herbicides. Systemic herbicides are absorbed and move within the plant to the site of action. Systemic herbicides tend to act more slowly than contact herbicides.
- Common trade or product names include but are not limited to:
 - Navigate
 - Weedar 64
 - Restore

