

INTRODUCTION TO AQUATIC VEGETATION MANAGEMENT

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AQUATIC VEGETATION

Can range from microscopic to large stemmed plants with bright, showy flowers

Why Do We Have Aquatic Vegetation?

- What do plants need for growth?
 - Water
 - Sunlight
 - Nutrients
- Ponds = nutrient sinks
- Accumulate nutrients from watershed & groundwater over time!
- **Prevention revolves around reducing these 3 things**



Reasons for Management



Ecological Effects

- Degrade water quality
- Reduce species diversity
- Suppress desirable native plants
- Alter animal community interaction
- Increase detritus build up
- Change sediment chemistry
- Increases evapotranspiration

Reasons for Management

Economic Impacts

- Impair commercial navigation
- Disrupt hydropower generation
- Increase flood frequency, duration and intensity
- Impair drinking water (taste & odor)
- Habitat for insect-borne disease vectors
- Recreational navigation impairment
- Interfere with safe swimming
- Interfere with fishing
- Reduce property value
- Increase drowning risk



What Does "Management" entail?

Control



Restoration



Early Season Management

- When prevention methods are unsuccessful, early detection and rapid response to new infestations have been shown to reduce management costs over the long term.



5-10 BILLION plants PER ACRE



PHYSICAL/CULTURAL CONTROL

- **Alter the environment/attitudes rather than direct control**
 - Cultural control focuses on education and preventing introductions
 - Public awareness: Boat ramp monitoring and wash stations
 - Physical control focuses on non-chemical, non-motorized techniques



MECHANICAL CONTROL

- Direct control using large power-driven equipment
- **Shredder and cutter boats**
 - Used in early AV management in US along navigable waters by USACE
 - Creates many fragments
 - Used for floating and emergent vegetation



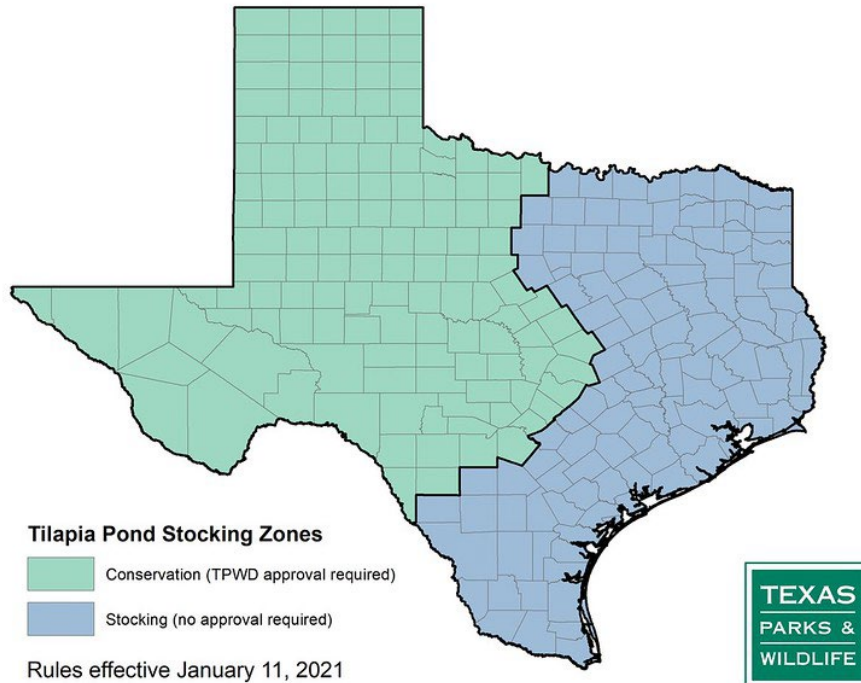
BIOLOGICAL CONTROL

- Using one organism to control another
 - Insects, herbivorous fish
- Insects not commercially available
- Best used as an IPM strategy
- No silver bullet



Triploid Grass Carp	Mozambique Tilapia
TPWD permit	Look for your zone
Effective control for 5-7 years	Stock yearly (die off when water temperature < 55°F)
7- 15 per acre recommended Max 10/acre/year	15-20 lbs. mixed sex recommended
Hydrilla Bushy pondweed American pondweed Illinois pondweed	Filamentous algae Duckweed Azolla

MOZAMBIQUE TILAPIA: REGULATIONS



- TPWD has identified two management zones
- TPWD approval of stocking required in “conservation zone”
 - Specific to pond
 - Transferrable with property sale
 - Invalidated if pond modified in a way that increases escape risk
- **Unlawful for tilapia stocked in private ponds to escape anywhere**

CHEMICAL CONTROL

- Using pesticides to control nuisance species
 - Herbicides and algaecides
- Must be labelled for aquatic use to use in or around water
- They are used at extremely low doses in water
- They do not persist very long in water (usually only a few days)



ACTIVE INGREDIENTS

- Copper & complexes of copper
- Carfentrazone
- 2,4-D
- Diquat
- Endothall
- Fluridone
- Imazamox
- Flumioxazin
- Sodium carbonate peroxyhydrate
- Triclopyr
- Imazapyr
- Bispyribac
- Glyphosate
- Penoxsulam
- Florpyrauxifen-benzyl

Active ingredients that are contained in aquatic herbicide products may also be present in products that are not approved for aquatic uses. It is not legal to apply an herbicide directly to water unless the herbicide label has specific instructions for application to water.

Aquatic Herbicides

- Concentration and length of time a target plant is exposed to that herbicide before it degrades is very important
- Unique considerations compared to terrestrial herbicides and typical considerations like plant species and plant stage
 - Placement in water column
 - Still or flowing water
 - Water uses
 - Volume

ACTIVITY IN THE PLANT

Contact Herbicides

- Immediate cell damage at point of contact
 - Fast acting
 - Can cause low dissolved oxygen issues
- Above ground tissue death
 - May have to be used more than once per growing season to control surviving plants
- Typically used on:
 - Annual species
 - Algae, sensitive free-floating plants, submerged species
 - Temporary treatment of emergent vegetation
- Good coverage is critical because missing even a small area or a few individuals can lead to rapid recolonization
- Copper sulfate, Copper complexes, Diquat, Sodium carbonate peroxyhydrate, Endothall, & Flumioxazin

Systemic Herbicides

- Translocated throughout plant
 - Slow acting
- Total plant mortality
 - Used to control perennial and woody species
 - Plant injury/mortality not seen right away
- Populations slower to recover, if at all
- Low dissolved oxygen typically not an issue
- Control is highly dependent on contact time
- Fluridone, Glyphosate, Triclopyr, Imazapyr, Imazamox, Bispyribac, floryrauxifen-benzyl & 2,4-D*
 - 2,4-D is a state limited use pesticide
 - Must have a pesticide license if more than 1 qt for liquid products or 2 lbs for dry or solid products

IDENTIFICATION



Algae

- primitive, non-seed bearing plants & no roots, stems, or true leaves

Floating

- all parts of plant floats (including roots)

Submerged

- mostly underwater, rooted with flaccid (limp) stems

Emergent

- rooted with stiff or rigid stems with all or parts standing above surface

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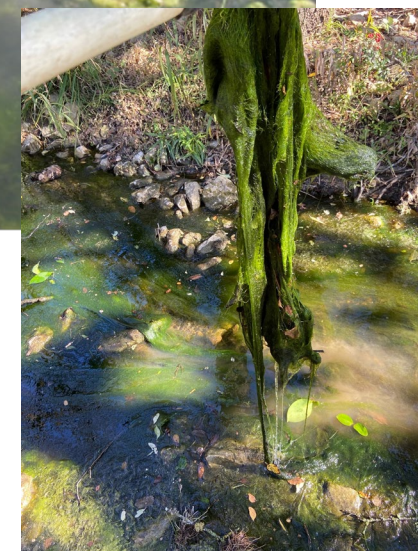
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Filamentous Algae

- Often referred to as “pond scum” or “pond moss” and #1 issue in ponds
- Made of single cells that form long visible chains, threads, and filaments that intertwine to resemble wet cotton or wool
- Grows along the bottom of the pond, like a carpet, in shallow areas during the spring
- Healthy filaments are dark green in color, coarse, and difficult to pull apart



FILAMENTOUS ALGAE



Photo by Janet Barr

- Chelated copper complexes, diquat, or copper sulfate
- Tank mix copper and diquat for best results
- Mozambique tilapia



CHARA- "MUSKGRASS"



- Macroalgae
- Appearance of whorled leaves
- Strong, garlic-like odor
- Treat when young
- Develops heavy coating of calcium carbonate





Chara



Coontail

TREATING WITH COPPER



Copper Sulfate:

- Contact
- Metallic
- Active up to 1 hour



Copper Chelate:

- Contact
- Metallic
- Active 4-6 hours
- Less toxic

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Photo by Peggy Romfh



Photo by Peggy Romfh

DUCKWEED

- Cluster of 1 or more
- Round or egg shaped
- Slightly curved
- Spongy
- 1 or more root nerves



Photo by Peggy Romfh

WATERMEAL

- Rootless
- Barely visible
- Oval shaped
- Size of a pinhead



DUCKWEED & WATERMEAL



- Carfentrazone
- Penoxsulam
- Fluridone
- Flumioxazin
- Diquat (duckweed only)
- Tilapia and ducks: Other issues- integrated management

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COONTAIL



- Forked, whorled leaves with small teeth
- Brittle, cord-like, and flexible stems over 10'
- Perennial that begins actively growing at water temperatures ~55 F



COONTAIL



- Not readily consumed by grass carp
- Reproduces very easy from fragmentation
- Diquat
- Endothall
- Fluridone
- Flumioxazin

AMERICAN PONDWEED



- Submerged, thread-like stem
- Leather-like, floating leaves
- Green-Brown seed heads above of the surface



AMERICAN PONDWEED



- Diquat
- Endothall
- Fluridone
- Grass carp - E

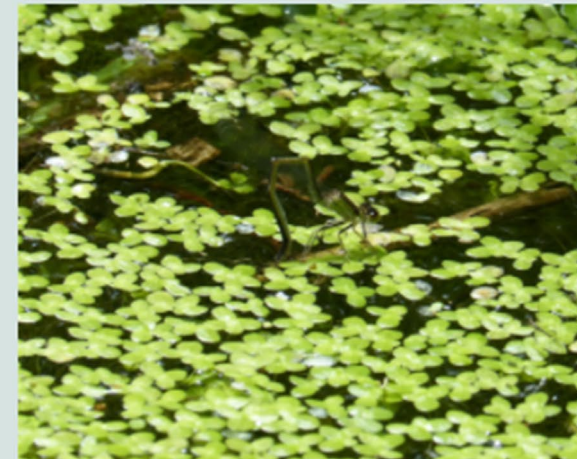
TREATMENT TIMING

- The best to treat algae, floating, & submerged aquatic vegetation is in spring before large biomass build up
- Water temperature between 65 – 88 F



Contact Herbicide

When using a contact herbicide, treat in sections of 1/4 to 1/3 of the pond at one time, wait 10-14 days, then treat the next section.



Repeat Treatment

Follow-up spot treatments are typically necessary.

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WATER PRIMROSE



- **Leaves:**
 - Oval-or sword-shaped
 - Up to 6" long
 - Covered on both sides by small, soft hairs
- **Flowers:**
 - Flower in all seasons, except winter
 - 4-5 petals
 - Yellow
- **Stem:**
 - Branched
 - Spongy when in water

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WATER PRIMROSE



- 2,4-D
- Glyphosate
- Imazamox
- Imazapyr
- Triclopyr
- Mowing/pulling

AMERICAN LOTUS



- **Leaves:**
 - Disk-shaped
 - Centrally shield-shaped
 - Up to 2.75 feet in diameter
 - Center cupped
 - Peduncles thick
- **Flowers:**
 - Pale yellow in color
 - Up to 10 inches wide
 - 20+ sepals and petals



AMERICAN LOTUS



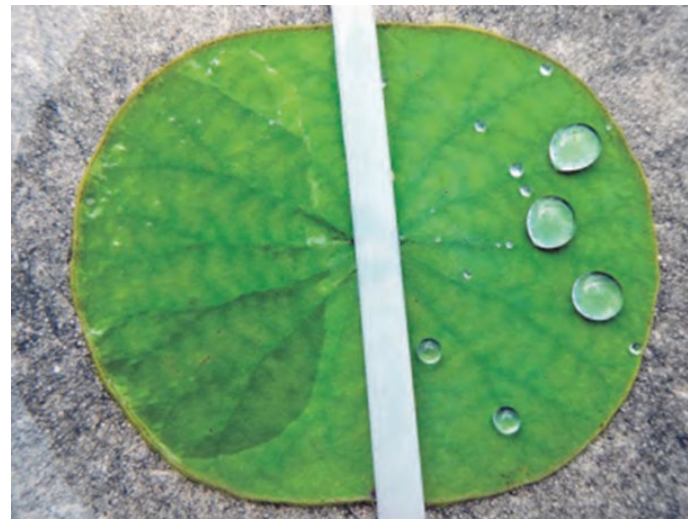
- Fluridone
- Imazamox
- Imazapyr
- Triclopyr
- 2,4-D
- Glyphosate

TREATMENT TIMING

Emergent/shoreline treatment is often best in fall before the first freeze when plant is storing food for winter


Repeated treatments typically necessary


Use good, quality, non-ionic surfactant or MSO




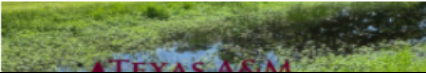
RESOURCES

The AquaPlant website is designed to help land owners identify and manage plants in their ponds or tanks. To best manage your pond vegetation, start by using the [Identify a Plant](#) section to correctly identify the plants in your pond, and then select the best management options to fit your needs for specific plants from the [Manage a Plant](#) section. Whether you choose to use a herbicide, biological control, or to remove plants manually, this site can help.

Identify a Plant

If you don't know the name of your plant, start here to compare photos and identify what type of plant is in your pond.

Manage a Plant

If you already know the name of the plant in your pond, start here to browse by name and find management options.

Fish Stocking & Pond Management


Aquatic Vegetation Fact Sheets


SEARCH FOR A TYPE OF PLANT
Search this website
Search

UPCOMING VIRTUAL TRAININGS - REGISTER NOW
[3/16: Fish Management Strategies](#)
[4/20: Aquatic Herbicides & Permitting](#)
[5/18: Water Quality for Fisheries Management](#)
[6/15: Aquatic Vegetation- Beneficial or Pest?](#)

Download Management Apps
Hire a Professional



<https://aquaplant.tamu.edu/>