Nuisance Aquatic Plants in Urban Lakes and Ponds
Urban Lakes / Retention Ponds

- Add value and curb appeal
- Flood and stormwater control
- Accept water from roads & yards
- Runoff water gathers oil, gas, pesticides, heavy metals, fertilizers, bacteria, and nutrients as it flows over roads, driveways and yards

These pollutants could cause serious harm if they flowed directly into water bodies without any filtration or decomposition
Urban Lakes / Retention Ponds

- Are easily invaded by non-native plants
- Algae feeds excess nutrients in the pond
- Excess nutrients come from lawn fertilizer, geese/pet waste, grass clippings, etc.
Pond Plan of Action

1. Treat symptoms
   • I have a pond weed problem now!
   • What are the treatment options?
   • What are the pros and cons for treatment options?
   • What is best for the overall pond health?

2. Prevention
   • What can we do to reduce nutrients going into the pond?
Treatment

Step 1: Identify the problem species
ID Your Weed

Websites
- http://aquaplant.tamu.edu/
- www.ppws.vt.edu/scott/weed_id/aquatics.htm
- www.outdooralabama.com/fishing/freshwater/where/ponds/p/ap/guide/
- http://aquat1.ifas.ufl.edu/

Book
Water plants for Missouri ponds
By James R. Whitley, Barbara Bassett, Joe G. Dillard, Rebecca A. Haefner

Bring in a sample of the weed to the Extension Office or Email pictures to tonyab@ksu.edu
Planktonic Algae
Common Pond Weeds

Duckweed

Watermeal
American Pond Weed
Eurasian Watermilfoil
Curly-Leafed Pond Weed
Coontail
Treatment

Step 2: Identify the options
Mechanical Removal

- No chemicals
- Minimal tools and know-how needed
- Not dependent upon water temperature or chemistry
- More cost effective
- Labor intensive
- Assess the level of effort needed
Mechanical Removal

• Hand harvesting
  – Pulling, raking, cutting or digging
  – Specialized rakes

www.gemplers.com
www.pondalgaesolutions.com
Benefits

• Doing it yourself = less cost
• Could be a shared community duty
• Get youth groups involved
• Borrow or rent a small boat
• Harvested algae and other weeds can be composted
• No potential exposure to hazardous chemicals, no need to worry about toxicity to fish
• Only treatment where nutrients are removed from waterbody
Chemical Weed Control

- Identify the plant pest
- Assess the acreage of infestation
- Know total pond acreage, average depth, flow rates
- Select labeled treatment
- Know the water chemistry
- Proper application and timing of applications is critical
## Common Names & Active Ingredients

<table>
<thead>
<tr>
<th>Common Name</th>
<th>Active Ingredient</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bluestone</td>
<td>Copper Sulfate (Contact Herbicide)</td>
</tr>
<tr>
<td>Cutrine Plus, K-Tea, Captain, Algae Pro, Clearigate, Komeen, Nautique</td>
<td>Chelated Copper (Contact Herbicide)</td>
</tr>
<tr>
<td>Navigate (Granular), Weed Rhap Weedar 64 (Liquid)</td>
<td>2-4 D (Systemic Control)</td>
</tr>
<tr>
<td>Aquathol, Hydrothol</td>
<td>Endothol (Contact Herbicide)</td>
</tr>
<tr>
<td>Rodeo, Aquamaster, Aquaneat</td>
<td>Glyphosate (Systemic Control)</td>
</tr>
<tr>
<td>Reward</td>
<td>Diquat (Contact Herbicide)</td>
</tr>
<tr>
<td>Sonar, Avast</td>
<td>Floridone (Systemic Control)</td>
</tr>
</tbody>
</table>
Herbicides
Contact vs. Systemic

**Contact herbicides**
- act quickly and kill all plants cells that they contact

**Systemic herbicides**
- absorbed within the plant and moves to the site of action
- tend to act more slowly than contact herbicides
Chemical Weed Control

Understand:
• Application requirements
• Aquatic herbicide label & MSDS
• Active ingredients
• Immediate and latent Impacts
• Application rate
• # of applications
• Potential problems
• Weather
• Water-use restrictions
Sites provide detailed information about the characteristics of aquatic herbicides listed in the table, including mode of action, selectivity, toxicity to humans and wildlife, application rates & timing, weaknesses & limitations, etc.
Important notes about chemical treatment

• No restrictions on aquatic herbicide in KS, no license required if applicator is HOA employee

HOWEVER:

• The chemicals may be harmful to plants, invertebrates, or fish, especially if applied improperly

• Most insurance companies will not accept the liability

• Bottom line: proper application should be performed by an trained and licensed professional
• Oxygen in a pond decreases when plants die and decompose
• Nutrients are not removed but returned to the waterbody, algae will likely return
• Treat only ½ to ⅓ of the pond at a time
• Wait 1-2 weeks then treat the next ½ or ⅓
• Watch for fish stress
  – Gulping for air at the surface in early morning hours
# Prices of Chemicals

<table>
<thead>
<tr>
<th>Chemical</th>
<th>Cost Per</th>
<th>Application Rate</th>
<th>Cost Per Treatment*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sonar (granular)</td>
<td>$38 / lb</td>
<td>30 lbs / acre-ft</td>
<td>$18,240</td>
</tr>
<tr>
<td>2, 4-D (granular) - Aqua-Kleen; Riverdale; Weedtrine II</td>
<td>$1.80 / lb</td>
<td>100 – 150 lbs / acre-ft</td>
<td>$4,320</td>
</tr>
<tr>
<td>Reward (Diquat)</td>
<td>$160 / gal</td>
<td>0.5 – 2 gal / acre-ft</td>
<td>$5,120</td>
</tr>
<tr>
<td>Rodeo</td>
<td>$72 / gal</td>
<td>1.5 gal / acre-ft</td>
<td>$1,728</td>
</tr>
<tr>
<td>Cutrine Plus (Chelated Copper)</td>
<td>$37 / gal</td>
<td>0.6-1.2 gal / acre-ft</td>
<td>$710</td>
</tr>
<tr>
<td>K-Tea (Chelated Copper)</td>
<td>$33.20 / gal</td>
<td>0.7-2.9 gal / acre-ft</td>
<td>$1,541</td>
</tr>
<tr>
<td>Aquathol (endothal)</td>
<td>$24 / lb</td>
<td>2.2-13.2 lbs / acre-ft</td>
<td>$5,069</td>
</tr>
</tbody>
</table>

*A 2-acre pond with an average depth of 8 feet = about 16 acre-feet, assumes highest application rate where variable*
Cost Analysis

- Cost of chemicals vary with application rate, water depth, formulation, geography, and water chemistry
- Price often determines which chemical treatment is best, but should not be the only consideration
- Consider costs for more than one treatment, labor hours to apply it, boat, spray equipment needed for liquid applications, wetting agents, etc.
<table>
<thead>
<tr>
<th>Aquatic Weed Classification</th>
<th>Aquatic Weed</th>
<th>Copper Algaecides (Several)</th>
<th>2,4-D (Reward &amp; WeedtrineD)</th>
<th>Diquat (Aquatrol &amp; Hydrothol)</th>
<th>Endothall (Sonar &amp; Avast)</th>
<th>Fluridone (Rodeo &amp; Others)</th>
<th>Glyphosate (Habitat)</th>
<th>Imazapyr (Renovate)</th>
<th>Triclopyr (Renovate)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Algae</td>
<td>Chara</td>
<td>E</td>
<td>P</td>
<td>G</td>
<td>G(^2)</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
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<tr>
<td>Filamentous</td>
<td></td>
<td>E</td>
<td>P</td>
<td>G</td>
<td>G(^2)</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
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<tr>
<td>Planktonic</td>
<td></td>
<td>E</td>
<td>P</td>
<td>G</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
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<tr>
<td>Floating Plants</td>
<td>Duckweed</td>
<td>P</td>
<td>G</td>
<td>G</td>
<td>P</td>
<td>E(^3)</td>
<td>F</td>
<td>G</td>
<td>P</td>
</tr>
<tr>
<td>Watermeal</td>
<td></td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>E(^4)</td>
<td>F</td>
<td>P</td>
<td>P</td>
<td>P</td>
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<tr>
<td>Rooted Floating Plants</td>
<td>Waterlilies</td>
<td>P</td>
<td>E</td>
<td>P</td>
<td>P</td>
<td>E</td>
<td>E</td>
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<td>E</td>
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<tr>
<td>Submersed Plants</td>
<td>Bladderwort</td>
<td>P</td>
<td>F</td>
<td>E</td>
<td>P</td>
<td>E</td>
<td>P</td>
<td>P</td>
<td>P</td>
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<tr>
<td>Coontail</td>
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<td>P</td>
<td>G</td>
<td>E</td>
<td>E</td>
<td>E</td>
<td>P</td>
<td>P</td>
<td>P</td>
</tr>
<tr>
<td>Elodea</td>
<td></td>
<td>P</td>
<td>G</td>
<td>E</td>
<td>P</td>
<td>P</td>
<td>P</td>
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<td>Naiad</td>
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<td>F</td>
<td>E</td>
<td>P</td>
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<td>P</td>
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<tr>
<td>Pondweeds</td>
<td></td>
<td>P</td>
<td>P</td>
<td>G</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
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<tr>
<td>Watermilfoil</td>
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<td>G</td>
<td>G</td>
<td>G</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>E</td>
</tr>
<tr>
<td>Emerged Plants</td>
<td>Arrowhead</td>
<td>P</td>
<td>E</td>
<td>G</td>
<td>P</td>
<td>P</td>
<td>E</td>
<td>E</td>
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<td>Water Primrose</td>
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<td>P</td>
<td>E</td>
<td>G</td>
<td>F</td>
<td>E</td>
<td>E</td>
<td>E</td>
<td>F</td>
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<td>Marginal Plants</td>
<td>Cattails</td>
<td>P</td>
<td>F</td>
<td>G</td>
<td>P</td>
<td>P</td>
<td>F</td>
<td>E</td>
<td>E</td>
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<tr>
<td>Smartweeds</td>
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<td>P</td>
<td>F</td>
<td>P</td>
<td>P</td>
<td>E</td>
<td>E</td>
<td>E</td>
<td>E</td>
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<tr>
<td>Purple</td>
<td>Loosestrife</td>
<td>P</td>
<td>F</td>
<td>P</td>
<td>P</td>
<td>E</td>
<td>E</td>
<td>G</td>
<td>G</td>
</tr>
<tr>
<td>Willow</td>
<td></td>
<td>P</td>
<td>E</td>
<td>P</td>
<td>P</td>
<td>E</td>
<td>E</td>
<td>E</td>
<td>E</td>
</tr>
<tr>
<td>Cottonwood</td>
<td></td>
<td>P</td>
<td>G</td>
<td>P</td>
<td>P</td>
<td>G</td>
<td>G</td>
<td>G</td>
<td>E</td>
</tr>
<tr>
<td>Approximate Cost(^6)</td>
<td>Acre-ft</td>
<td>$2.50-20/</td>
<td>$250-700/</td>
<td>$15-30/</td>
<td>$33-133/</td>
<td>$80-320/</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

\(^1\) E = Excellent, G = Good, F = Fair, and P = Poor or none. Refer to product labels for specific recommendations.
\(^2\) Hydrothol formulation only.
\(^3\) AS formulation only.
\(^4\) Herbicide cost varies with application rate, water depth, formulation, geography, and market fluctuations. Contact local supplier for current retail prices.
Calculating Pond Size

Area

Avg length x Avg width = total square feet

Graph paper method in (Aquatic Plants booklet)
Calculating Pond Size

Volume

Pond area in sq ft x Avg depth in ft = Total Volume in Cubic Feet

For **acre feet** divide cubic feet by 43,560

Find average depth by taking depth measurements, spaced evenly throughout pond
Biological Control

• Common Species - Grass Carp
• Stocked for Vegetation Control
• Greatest Impact at 12-24" in Length
• Metabolism Slows with Age

~ 7 Years of Productivity
  5 Per Acre - Preventative
  0-20 Per Acre - Corrective
Grass Carp Drawbacks

• Consume all aquatic vegetation and overhanging terrestrial vegetation, thereby reducing food available to native invertebrates and other fishes
• Do not like planktonic or filamentous algae and will typically eat all the beneficial plants instead
• Often increase phytoplankton populations by enriching the system with their undigested and expelled plant material, promoting algal blooms
• May also carry several parasites and diseases known to be transmissible to native fishes
Prevention of Nuisance Aquatic Plants

*Intellectuals solve problems; geniuses prevent them.*

- Albert Einstein
Common Lawn Care Mistakes that Impact Your Pond

- Mowing
- Watering
- Fertilizing
Mowing

• Set mower blade to cut off only the top 1/3 of the blade
• Leaving less than 2/3 of the grass blade causes
  – Weed growth
  – Potential heat stress
  – Harmful insects
  – Disease
Mowing

- Fescue’s recommended height is 2 - 3 inches
- Follow the 1/3 rule and don’t bag the clippings
- Keeping clippings on the lawn reduces fertilizer applications by 25%
- Don’t allow clippings into pond either!
### Cool Season Grasses

<table>
<thead>
<tr>
<th>Grass</th>
<th><strong>Mowing Height</strong></th>
<th><strong>Traffic Tolerance</strong></th>
<th><strong>Soil Type</strong></th>
<th><strong>Sun</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Bentgrass</td>
<td>1/2 -1&quot;</td>
<td>light</td>
<td>tolerates acidic</td>
<td>full</td>
</tr>
<tr>
<td>Bluegrass</td>
<td>2-2 1/2&quot;</td>
<td>light</td>
<td>pH 6.5-7 neutral</td>
<td>full</td>
</tr>
<tr>
<td>Perennial Ryegrass</td>
<td>2-3&quot;</td>
<td>high</td>
<td>most types</td>
<td>full</td>
</tr>
<tr>
<td>Fine Fescue</td>
<td>2-3&quot;</td>
<td>light</td>
<td>most types</td>
<td>full/shade</td>
</tr>
<tr>
<td>Tall Fescue</td>
<td>2-3&quot;</td>
<td>high</td>
<td>most types</td>
<td>full/partial</td>
</tr>
</tbody>
</table>

### Warm Season Grasses

<table>
<thead>
<tr>
<th>Grass</th>
<th><strong>Mowing Height</strong></th>
<th><strong>Traffic Tolerance</strong></th>
<th><strong>Soil Type</strong></th>
<th><strong>Sun</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Bahia</td>
<td>2-2 1/2&quot;</td>
<td>moderate</td>
<td>many types</td>
<td>full/mode rate</td>
</tr>
<tr>
<td>Bermuda</td>
<td>1 1/2 -2&quot;</td>
<td>high</td>
<td>light textured</td>
<td>full</td>
</tr>
<tr>
<td>Centipede</td>
<td>1 1/2 -2&quot;</td>
<td>light</td>
<td>tolerates acidic</td>
<td>full/partial</td>
</tr>
<tr>
<td>St. Augustine</td>
<td>2-3&quot;</td>
<td>high</td>
<td>prefers sandy</td>
<td>full/partial</td>
</tr>
<tr>
<td>Zoysia</td>
<td>1 - 2&quot;</td>
<td>high</td>
<td>pH 5.5-6.5 slightly acidic</td>
<td>full/partial</td>
</tr>
</tbody>
</table>
Watering

No more than 1 inch per week:
  – Includes rain
  – Tuna can method

Grass needs water when:
  – Grey-blue cast
  – Footprints are visible after 30 min or more
Watering

• In summer, water 1-2 times per week, 1 inch total
• Morning watering is best
• In fall, water every other week if weather is dry
• Don’t let water rush down the street gutters

PLEASE! DON’T POLLUTE!
DRAINS TO RIVER
PLEASE NOTE

• Just because your lawn turns brown during extremely dry periods doesn't mean it's dying.

• Grass will go dormant during such periods. Your lawn doesn't have to be green to be healthy.

• Most grasses can survive 30-60 days of drought without substantial losses.
Keys to Fertilizing

- Right time
- Right Quantity
- Right Mixture
Right Time

Cool Season vs. Warm Season Growth Patterns

Cool Season

Warm Season

Growth Rate

Spring

Summer

Fall
Right Mixture

Nitrogen: key nutrient in plant growth.
21% N in a 50 lb. bag = 10.5 lbs. N

Phosphorus: important for establishment.
3% P in a 50 lb. bag = 1.5 lbs. P

Potassium: will increase stress tolerance.
20% K in a 50 lb. bag = 10 lbs. K

P & K needed only as soil test indicates
## Right Quantity

More $\neq$ Better

<table>
<thead>
<tr>
<th>Nitrogen</th>
<th>Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 – 12</td>
<td>8 pounds/1,000 square feet</td>
</tr>
<tr>
<td>12 – 18</td>
<td>6 pounds/1,000 square feet</td>
</tr>
<tr>
<td>19+</td>
<td>4 pounds/1,000 square feet</td>
</tr>
</tbody>
</table>
Soil Test

• Turf lawn test
  – Nitrogen
  – Phosphorus
  – Potassium
  – pH
  – Organic Matter

• Follow proper sampling methods
  – See *Procedure for Taking a Soil Test* handout

• Sedgwick County Extension Office

• Cost $18
Using a Lawn Service?

• Don’t assume your lawn care professional or maintenance company is following these practices

• Be sure to talk to your service provider about their methods to reduce nutrient overload
Buffers Can Help!
Vegetative Buffers

• Runoff filtering
  – Soluble pollutants, including plant nutrients, are taken up through plant roots or consumed by microbes
  – Slows the flow of runoff to reduce channel erosion and stabilize soil

• Shoreline stabilization
  – Natural buffers can protect against bank erosion

• Noise screen
  – Filters out noise associated with adjacent land use

• Aesthetic value
  – Natural vs. Artificial
Which of these is more likely to attract desirable wildlife and reduce pollutant loads?
Native Buffer Grasses & Wildflowers

http://www.kansasnativeplantsociety.org/
Kansas Native Plant Landscaping Fact Sheet

Little Blue Stem  Coreopsis grandiflora  Bracted Spiderwort  Purple Coneflower