Virtual workshop series: Water quality and aquatic plant management

Natural Resources PFT

Kansas Center for Agricultural Resources and the Environment (KCARE)

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Water quality and aquatic plant management

- Offered as a Professional Development Event in PEARS for county extension agents
- Date/Time: June 16 to June 23, 8:30 am to 9:30 am
- **Zoom Meeting ID: 952 6066 1935**

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Schedule

- **Day 1: Aquatic plant management in ponds**
  - Tuesday, 6/16, 8:30-9:30 a.m.
  - Presenter: Charlie Lee, Extension Specialist, Department of Animal Sciences and Industry, K-State
- **Day 2: Water Contaminants affecting cattle health**
  - Thursday, 6/18, 8:30-9:30 a.m.
  - Presenter: A.J. Tarpoff, Assistant Professor and Extension Beef Veterinarian, Department of Animal Sciences and Industry, K-State
- **Day 3: Blue-green algae and its dangers to livestock and pets**
  - Tuesday, June 23, 8:30-9:30 a.m.
  - Presenters: Steve Ensley, College of Veterinary Medicine, Kansas State University; Scott Fritz, Kansas State University Veterinary Diagnostic Laboratory; Jody Holthaus, Extension Agent, Meadowlark District; and Elizabeth Smith, KDHE Bureau of Water

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Today's format

- If you haven't already, **please mute** your microphones.
- Speakers will present for 30-40 minutes
- Panelists will join the discussion at the end
- Please ask questions through the **chat** function (located at the lower part of your screen).
- Although our "end time" is posted for 9:30 a.m., participants are welcome to remain longer if they want to discuss the topic further.
- Please take a moment to participate in the survey.

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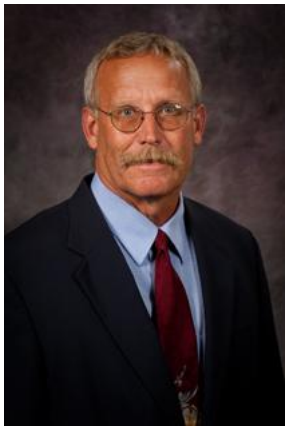
Speaker



Charlie Lee

Extension Specialist, Department of Animal Sciences and Industry, Kansas State University

Panelists

Brian Rees, County Director, Lyon County
Cody Miller, Extension Agent, Phillips-Rooks District

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Aquatic Plant Management In Ponds

Charlie Lee
Extension Wildlife Specialist
Department of Animal Sciences and Industry
K-State Research and Extension

Benefits of aquatic vegetation

- Primary producers in pond
- Provide food and/or shelter for fish or other species
- Produce oxygen
- Improve water quality
- Nutrients used by aquatic plants are not available for algae so improves clarity

Problems

- Reduces recreational enjoyment
- Too much shelter for small fish
- May cause fish kills when plants die
- Bad taste and odor
- Increases sedimentation rates

Conditions for Aquatic Plant Growth

- Light
  - Turbidity: maybe only a few inches of photic zone
  - Depth: extremely clear water may have 300 feet of photic zone
- Nutrients- carbon, nitrogen and phosphorus
  - Water nutrients or sediment nutrients

Weed ID

- You MUST identify the plant in order to manage it!
- Aquatic weed identification and control
  - http://aquaplant.tamu.edu/plant-identification/
  - http://plants.ifas.ufl.edu/plant-directory/aquatic plant-identification/

Plant Identification: Aquatic Weeds

- Algae- simple plants without roots, leaves, stems or flowers.
  - They reproduce by cell division, fragmentation, or by spore formation
- Vascular plants - plants having roots, stems, leaves, and flowers.

  Submersed, free-floating, rooted floating, emerged plants

Three types:

1. Planktonic algae - essential, cause blooms, shade pond bottom, but can cause fish kills by lowering O_2
2. Filamentous algae - thread-like filaments that form mats on surface of the pond. As algae photosynthesize, oxygen gets trapped in the body causing them to rise to the surface as clumps.

Examples:

- *Spirogyra* - bright green and slimy
- *Cladophora* - cotton mat algae, due to texture
- *Pitophora* – horsehair, coarse

3. Chara – Large green algae that are anchored to the bottom and do not extend above the surface

Planktonic algae: essential, cause blooms, shade pond bottom, but can cause fish kills by lowering O_2

Cyanobacteria or blue green algae

- Probably always present in a pond
- Been around for millions of years. When environmental conditions just right it blooms -7 day life cycle
- Sometimes produces toxins
- Livestock deaths since 1890's
- When you kill the plant, toxins are released throughout the water column

Filamentous algae:
Single cells that form long chains and then float.
No known direct food value except for invertebrates.

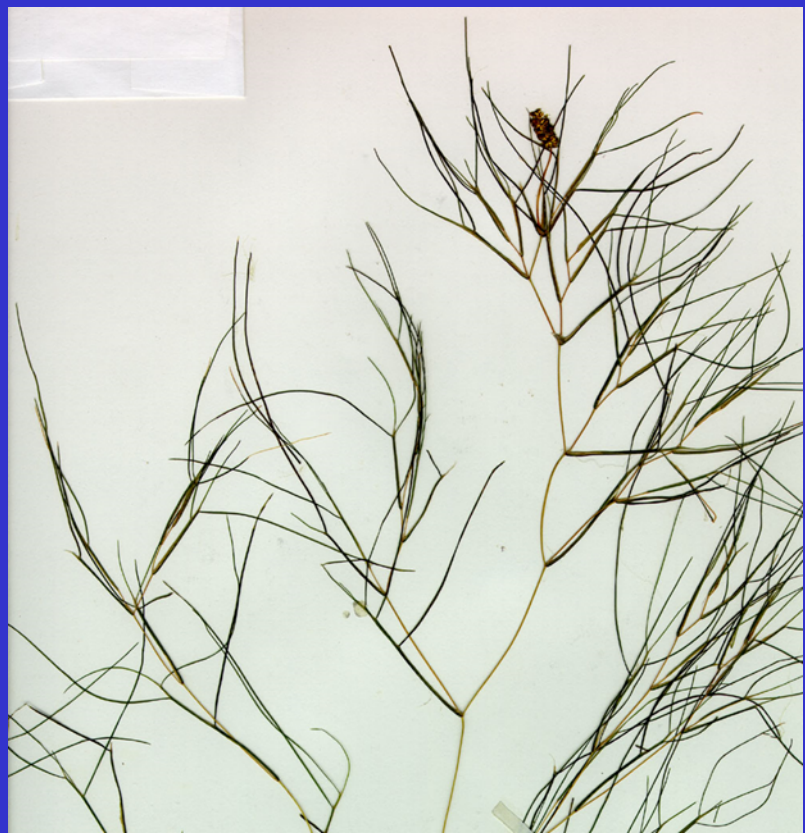
Chara:
called muskgrass or skunkweed because of garlic-like odor, often confused with emerged flowering plants, crunchy texture.

Submerged plants
(grow mainly below surface and have very soft stems)

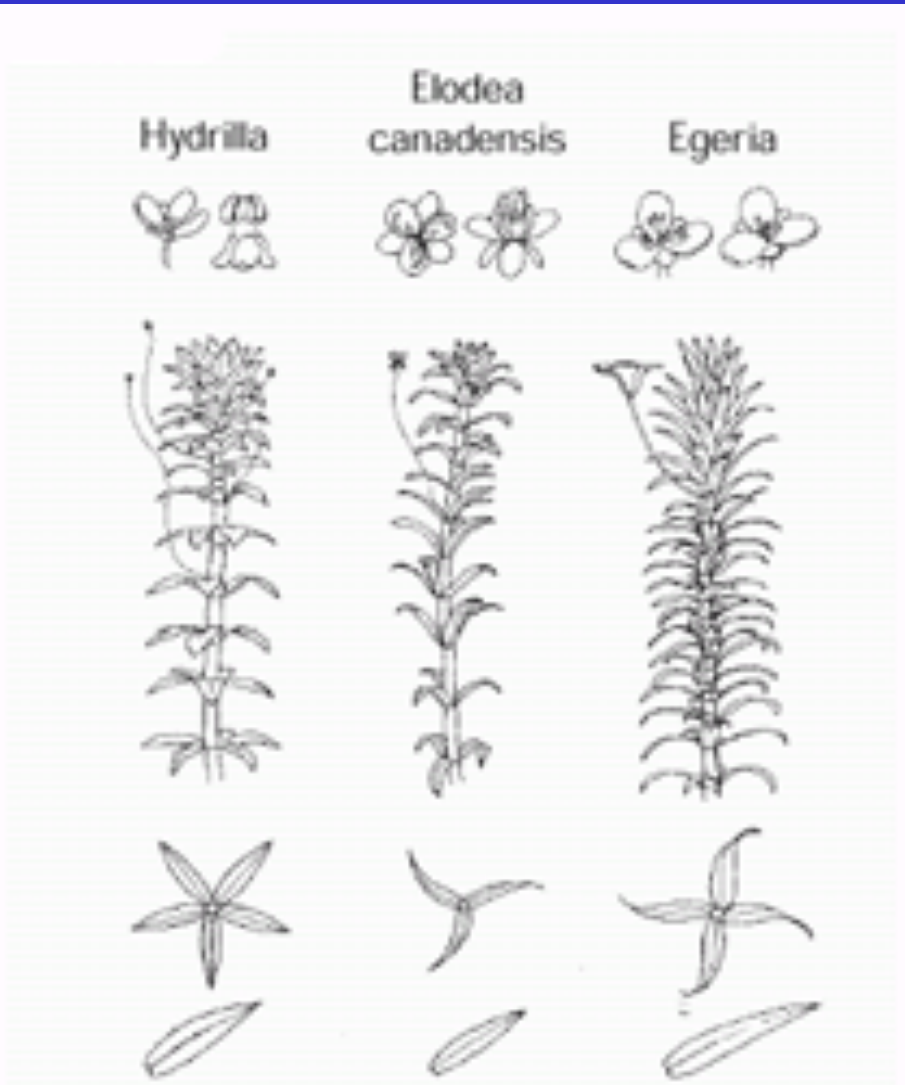
- Pondweeds
- Elodea
- Watermilfoil
- Coontail
- Naiads
- Bladderwort

American pondweed

Sago pondweed



Elodea



Water milfoil

Aquaplant

Southern naiad

Aquaplant

Coontail

Aquaplant

Aquaplant

Aquaplant

Floating Plants
(free floating or rooted with floating leaves)

- Duckweed
- Watermeal
- Water lily
- American lotus

Duckweed or watermeal?


American lotus
Aquaplant


Water lily
Aquaplant

Emergent plants
(rooted in water but most of foliage above water)

- Arrowhead
- Cattail
- Water primrose

Arrowhead


Cattail

Water primrose

State quarantine

Hydrilla

Purple loosestrife

What do I do about it?

- Algae control (short term solutions)
  - Chemicals
  - Fish
  - Shading
  - Microbial
  - Phosphorus inactivation (alum floc)

- Reduce nutrient run off
- Find alternative water source
- Aeration

Watershed cover

- Rangeland, cropland, suburban
- Waterfowl use
- Good plants for buffers
  - Native grasses- big four plus
    - Gama grass, cordgrass, sandreed,
  - Forbs
    - arrowhead, cattails, sedges, marsh milkweed, water smartweed and bulrushes
- Usually not necessary to plant in basin

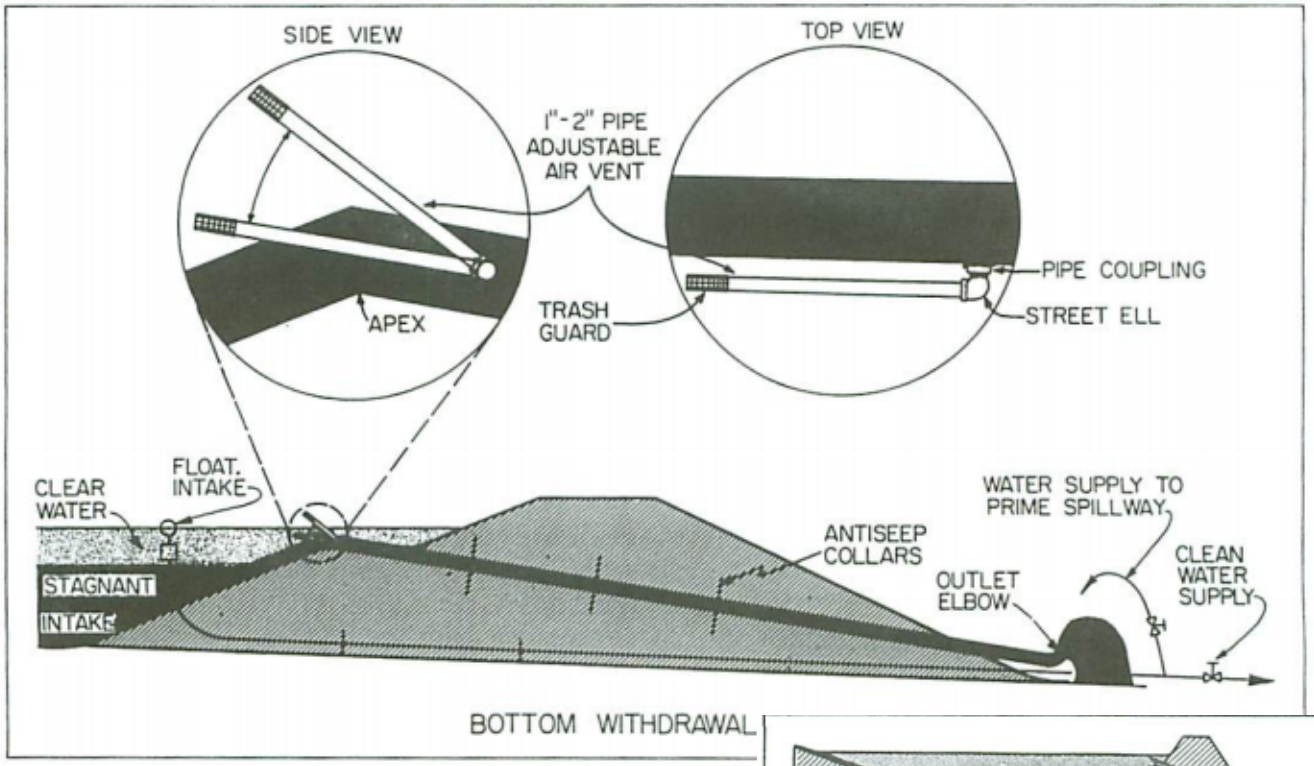


Figure 3. Cross-sectional view of a bottom-withdrawal spillway ins

Bottom withdrawal spillways (MDOC drawings)

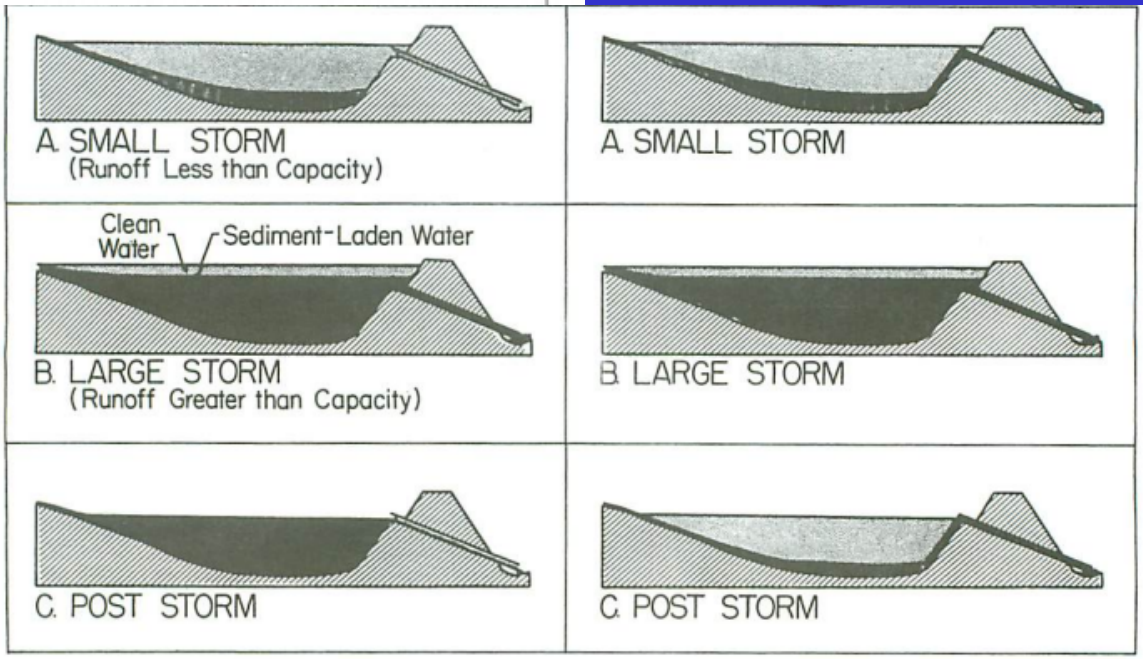


Figure 1. Cross-sectional view of a pond with a surface-withdrawal spillway.

Figure 2. Cross-sectional view of a pond with a bottom-withdrawal spillway.

Aquatic Weed Control

- Treatment may be recommended when aquatic weeds cover more than 25 percent of the pond's surface area.
- Types of control
  - Physical
  - Mechanical
  - Biological
  - Chemical

Physical control?

- Pond drawdown
- May work for LARGE LAKES
- Need some areas of deep water for fish refuge
- Only draw down in the WINTER time
- Expose bottom for at least ONE MONTH
- Spray exposed weeds when they are green

Mechanical control?

Biological Control?

- Plant-eating fish.
- Introduced from Asia in 1963.
- Reaches 60 pounds.
- *Triploid* species available for stocking.

Grass Carp as a Biological Control of Aquatic Weeds

- Can be very effective but they are not a cure-all.
- May result in turbid water.
- Overstocking can seriously effect sport fish populations.
- Cattails, spatterdock and filamentous algae are eaten last.
- Results are not guaranteed.

Grass Carp Guidelines

- Stock only if pond surface is more than 20 percent covered in vegetation.
- Calculate pond size accurately.
- Total elimination of vegetation occurs at 30 fish (10-12 inches) per acre of vegetation.
- Vegetation control occurs at 15 fish (10-12 inches) per acre of vegetation.

Biological control

- Will fish control HABs?
  - Perhaps
  - Tilapia
    - Stocking rate 25-50/ac adults
    - Digestion efficiency ranged from 58.6 to 78.1% at water temperature of 77°F.
    - Ingestion rate increased with increasing fish weight and water temperature
    - Major problem is they die when water temperature is below 55°F

Chemical Control:

its not without problems!

Considerations prior to treatment to avoid fish kills

- Percent of pond covered
- Water temperature
- Plant maturity
- Time of year
- Chemical mode of action

You must calculate the area and volume of a body of water

Area = length X width
Surface area in acres = pond area in square feet/43,560

Volume = average length X average width X average depth

Acre feet = surface area (acres) X average depth

Online calculator
https://mdc.mo.gov/property/pond-stream-care/ponds-plant-management/pond-area-estimator

Important Points to Remember

- Match aquatic weed with appropriate herbicide.
- Use only registered herbicides.
- FOLLOW LABEL INSTRUCTIONS.
- Treat evenly.
- Apply chemical early in the growing season.
- Check water hardness (>40ppm) when using copper.

Chemicals

- Sodium percarbonate – algae
- Copper – algae (powder or liquid)
- Diquat – contact herbicide (Reward)
- Endothal – contact herbicide (Aquathol)
- Floridone (Sonar) – residual herbicide
- Glyphosate (Rodeo) – grasses, shoreline
- 2,4-D – growth regulator
- Triclopyr – brush (Renovate)
- Imazapyr – emergent weeds (Habitat)
- Penoxsullam (Galleon) Floating plants
- Aquashade – pond water dye – part of algae control

Some estimated rates and costs (June 2020)

Herbicide	Rate	Approximate cost
Aquathol	0.3-2.6 gal./ac./ft. of 4.2L	$42-$360/ac.ft.
Penoxsulam	0.1-26 oz./ac. ft.	$2-564/ac.ft.
Diquat	0.25-2 gal/ac./ft. of 2L	$18-$150/ac.ft.
2,4-D	1-2.8 gal. surface acre of 47%	$40-128/surface ac.
Copper compounds	0.6-3.0 gal. chelated copper/ ac.ft.	$28-$138/ac.ft.
Fluridone	3.8-7.7 oz. ac./ft.	$62-$125/ac.ft.
Glyphosate	4-7.5 pt./surface acre of 5.4L	$48-$90/surface ac.
Triclopyr	.7-2.3 gal./surface acre of 44%	$56-$184/surface ac.
Sodium carbonate per.	3-170 pounds/ac./ft. of 50G	$7-$400/ac.ft.
Imazamox	17-173 oz./surface ac.	$39-404/surface ac.
Imazapyr	6-64 oz./surface acre of 4lb/gal	$37-$400/surface ac.
Acid blue and acid yellow (dyes)	20-80 oz./ac./ft.	$8-32/surface ac.

Labels change frequently. Read and follow the label!

Response of common aquatic weeds to herbicides
Rotate products

Aquatic group and weed	copper complexes	2, 4-D*	diquat*	endothall*	fluridone	glyphosate
Algae						
planktonic	E	P	P	P	P	P
filamentous	E	P	E	G (hydro)	P	P
chara	E	P	G	G (hydro)	P	P
nitella	E	P	G	G (hydro)	P	P
Tank mixes						
diquat 1:1 with cutrine + ($80/surface ac.)						
Sodium percarbonate (PAK-27) 25#/ac/ft. + copper sulfate ($52/ac/ft.)						
Clipper effective on resistant species 12 oz. + surfactant ($297 per ac.)						
Floating Plants						
bladderwort	P	G (gran)	E		E	
duckweeds	P	G (LV)	G	P	E	
water hyacinth	P	E	E		P	G
watermeal	P	P	P-F		F-G	

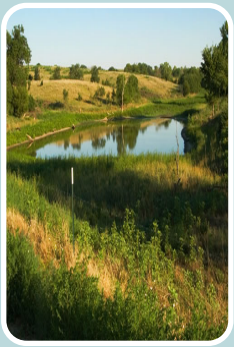
Response of common aquatic weeds to herbicides

Aquatic group and weed	copper complexes	2, 4-D*	diquat*	endothall*	fluridone	glyphosate
Emergent Plants						
American lotus	P	E	P	P	F	G
arrowhead	P	E	G	G		E
cattails	P	G	G	P	F	E
water lily	P	E	P		E	E
sedges & rushes	P	F	F		P	G
smartweed	P	E	F		F	E
water primrose	P	E	F	P	F	E
willows	P	E	F		P	E
Submersed Plants						
broadleaf water milfoil	P		E	E	E	P
coontail	P	G	E	E	E	P
elodea	P		E	F	E	P
eurasian water milfoil	P	E	E	E	E	P
naiads	P	F	E	E	E	P
pondweeds	P	P	G	E	E	P

TREATED WATER USE RESTRICTIONS (NUMBERS OF DAYS).

Common Name	Trade Name	Human			Animal	Irrigation		
		Drinking	Swimming	Fish Consumption	Drinking	Turf	Forage	Food Crops
2,4-D	DMA 4 IVM, Hardball, Navigate, AquaKleen	-[ab]	0	0	0	21[bc]	21[bc]	21[bc]
Bispyribac-sodium		0	0	0[d]	-[e]	-[e]	-[e]	-[e]
Carfentrazone-ethyl	Stingray	1	0	0	-[f]	14[g]	14[g]	14[g]
Copper Complexes Copper Sulfate	Algimycin PWF, Captain, Clearigate, Current, Cutrine Plus, Cutrine-Ultra, Harpoon, Komeen, K-Tea, Nautique, Symmetry	0[h]	0	0	0	0	0	0
Diquat	Harvester, Redwing, Reward, Weedtrine	1-3	0	0	1	1-3	5	5
Endothall	Aquathol K, Aquathol Super K, Hydrothol 191, Hydrothol Granular	7-25[i]	0	0	7-25	0	7-25	7-25
Flumioxazin		0	0	0[d]	0	0.5-5[j]	0.5-5[j]	5
Fluridone	Avast, Sonar A.S. Sonar One, Sonar PR, Sonar Q, Sonar SRP,	0	0	0	0	30	30	30
Glyphosate	Avocet, Aquapro, Rodeo, Shore-Klear, Shore-Klear Plus, Touchdown Pro	0	0	0	0	0	0	0
Imazamox	Clearcast	-[k]	0	0	0	-[k]	-[k]	-[k]
Imazapyr	Aquapier, Gullwing, Habitat	2	0	0	0	120[l]	120[l]	120[l]
Penoxsulam	Galleon	0	0	0	0	-[m]	-[n]	-[o]
Sodium Carbonate Peroxyhydrate	Pak 27, Phycomycin SCP	0	0	0	0	0	0	0
Triclopyr	Navitrol, Navitrol DPF, Renovate3, Renovate OTF	-[p]	0	0	0	-[q]	120	120
Acid Blue #9 & Yellow #23 Dyes	Aquashade, Enviro-Blue	0	0	0	0	0	0	0

Things to recall if you got a nap!



Does it really need treatment or is it just a hassle?

Is chemical control the best choice?

ID the weed!

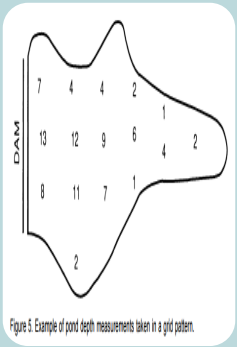
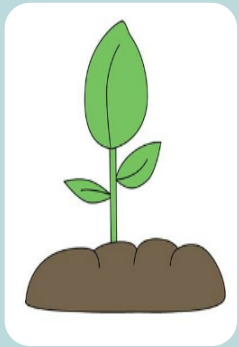


Figure 5. Example of pond depth measurements taken in a grid pattern.

Measure the pond volume!



Treat while plants are actively growing which is early in the season!

Follow the label!

Fence livestock out!

Questions?

Panelists:
Brian Rees
Cody Miller

Charlie Lee
clee@ksu.edu
Office 785-532-5734
Cell 785-565-1867

Water quality impacts of livestock operations and grazing management

Aquatic plant management in ponds

Tuesday, June 16

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