Managing Aquatic Weeds

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Managing weeds in aquatic habitats is not that different from managing weeds in landscapes.
Develop a plan based on:

- Weeds present
- Use of the site
- Economic limitations
- Aesthetic expectations
- Environmental considerations
- Utilize multiple methods that best fit
- Realize multiple weeds will usually require multiple methods/products
Both Desirable and Non Desirable Plants

- Desirable because
  - Stabilize shorelines
  - Absorb nutrients – improve water quality
  - Can be attractive
  - Food source and habitat for wildlife, especially ducks, fish
  - Plantings on banks deter geese
Non Desirable

• Impede water flow
• Impede recreational activities
• Aesthetics, appearance
• Reduce habitat value, fish kills when out of balance
• Increase rate of sedimentation

**Giant Salvinia** – Many aquatic plants reproduce quickly, spread rapidly – introduced species often become *invasive*. 
Why Do Some Aquatic Plants Become Aquatic Weeds?

• Reproduce and spread rapidly
  – Seed, fragments, roots
  – Water, wildlife, boats, equipment

• Most are introduced species
  – More competitive
  – No natural enemies

• Large bodies of clear, shallow water
  – High nutrient levels, esp. N and P
Variety of Control Methods

- **Cultural** – preventing weeds, altering habitat
- **Mechanical** – hand/machine removal
- **Biological** – natural predators
- **Chemical** – aquatic herbicides

Which is right for your situation depends on the weed to be controlled, how body of water used, budget, and environmental and aesthetic considerations.
Aquatic vs. Landscape Weeds

- **Differences:**
  - Most aquatic weeds are perennial, difficult to eradicate
  - Aquatic environments are more sensitive
  - Spraying herbicides in aquatic areas requires pesticide license with *aquatic subclass* – also must use *formulations labeled* for use in aquatic environments
Spraying Aquatic Weeds

- Must have aquatic subclass if “purposefully applying to water”
  - Includes retention ponds, ditches AND ditchbanks, lakes, wetlands, etc.
- Not necessary if ONLY applying to banks, up to water’s edge
Spraying Aquatic Weeds

• Must use aquatic herbicides, registered for use in aquatic habitats

• Improper use – up to $2000 fine + potential for additional fines from DENR Division Water Quality

• Stay out of trouble - Have the right license, use appropriate products, and READ and FOLLOW label directions!
Controlling Aquatic Weeds

• First step same as controlling any weed
  – **Must have weeds properly identified!**
  – Control method will depend on type of weed
  – Most herbicides effective for specific weeds only

Duckweed or Algae?
Types of Aquatic Plants

• Algae
• Floating
  – Free
  – Rooted
• Submersed
• Emergent
Algae

- **Planktonic Algae**
  - ‘Pea Soup’
  - Excess nutrients

- **Filamentous Algae**
  - Grow up from the bottom
Free Floating

- Float on water surface with roots dangling below
- Often very prolific
- Many noxious weed species

• Duckweed
  - Up to ¼”, small root

• Watermeal
  - Smaller, gritty
Free Floating-Non Native

- Giant Salvinia
  - Federal Noxious Weed
- Water Hyacinth
Water Hyacinth, Cape Carteret
This Started With 1 Plant!!!
Submersed Plants

- Rooted in the bottom, can grow to depths of 10’+ if clear water
- Leaves grow up through water, but usually do not emerge
- Flowers may emerge above
- Native species provide habitat for fish
- Several problematic non native species

Lake infested with Hydrilla
Native Submersed Aquatic Plants

- **Coontail**
  - *Ceratophyllum demersum*
  - Feel rough
  - Non showy flowers stay submerged

- **Variable Leaf Watermilfoil**
  - *Myriophyllum heterophyllum*
• **Parrotfeather**
  
  – *Myriophyllum aquaticum*
  
  – Related to water milfoil, non native
  
  – Feathery whorls of leaves
  
  – Stems sometimes red
  
  – Emerges out of water
  
  – Grows in shallow (3’) water
• Brazilian Elodea
  – *Egeria densa*
  – Non native
  – Smooth to touch
  – Showy flowers
  – Leaves in whorls of 3-6
Floating Leaf Plants

- Rooted in the bottom
- Leaves attached to long, tough stems, float on surface or emerge above
- Flowers float on surface or emerge
- Most are rhizomatous – spread rapidly
- Can grow in 6’ of water or more, need permanent water

Spatterdock
• Water Lily
  – *Nymphaea odorata*

• Floating Heart
  – *Nymphoides cordata*
  – *N. aquatica*
Emergent Aquatics

- Sometimes referred to as shoreline or marginal plants
- Grow in shallow water, less than 1’
- Most of foliage above water level
- Includes broadleaf plants, grasses, sedges and rushes
Broadleaf Emergents

• Pickerelweed
  – *Pontederia cordata*
  – 3’ tall
  – Flowers summer
  – Native, Common
Water Primrose

- *Ludwigia* species
- Many species, some native, some non-native
- Most perennial
- Summer flowers

*L. hexapetala* - non-native
Alligator Weed

- *Alternanthera philoxeroides*
- Spreads rapidly by seed or fragmentation
- Non native
- Can be aquatic or terrestrial
- Aquatic forms have hollow stems
- Flowers summer
• **Hemp Sesbania**
  – *Sesbania exaltata*
  – Showy yellow flowers, green bean like pods

• **Bladderpod**
  – *Sesbania vesicaria*
  – Poisonous
  – Very small flowers, butter bean like pods

Both are annual
Sedges and Rushes

• Sedges have edges, Rushes are round
• Most under 3’
• Most clump forming

Common Rush, *Juncus effusus*
Cattails
*Typha latifolia, T. angustifolia*

- Often form large monocultures
- Will only grow in less than 2’ of water
Common Reed
*Phragmites australis*

- Creates large monocultures with little habitat value
- Native to most of the world
- Has become problematic since the 1970’s
ID Guides

- Aquatic & Wetland Plants of SC
  - [http://www.dnr.sc.gov/invasiveweeds/aquabook.html](http://www.dnr.sc.gov/invasiveweeds/aquabook.html)

- Aquatic Weeds: Pocket Guide
  - [http://www.weedscience.ncsu.edu/aquaticweeds/](http://www.weedscience.ncsu.edu/aquaticweeds/)
Samples

- Fresh!
- In moist paper towels – not a bag of water!
- Complete – if floating, whole plant, if rooted, stem with several leaves

Giant Salvinia
Controlling Aquatic Weeds – An Integrated Approach

- Choose combination of methods best suited to:
  - Weed species
  - Water use
  - Budget
  - Environmental issues and wildlife,
  - Aesthetics
Prevention

- Don’t plant weeds!
  - Avoid rhizomatous species
- Inspect new plant material for hitchhikers
- Don’t bring weeds in on equipment
  - Seeds, roots, fragments

Scouring Rush/Horsetail – spreads rapidly in shallow water and dry land
Floating Plants Increase Rapidly
Disposing of Excess Plants

- Give excess to friend
- Dispose of properly
- **DO NOT** “Give them a good home” in a nearby water body
Cultural Control

• Habitat Modification
  – Most practical: Reduce light
  – **Pond Dyes**, eg. Aquashade

• Can control **algae** and **submersed weeds**
  – Not a herbicide, blocks light – best applied **early in growing season**

• **Closed systems**
  – Should not be applied to drinking water or streams

Too late to apply dye!
Biological Control

• **Triploid Grass Carp** (sterile)
  – Only effective on **submersed species**,(coontail, elodea, hydrilla), **NOT algae**
  – Use in closed systems – no outflow
  – 10-15 fish per acre, at least 10” long
  – Can live 10 years, weigh up to 50 lbs.
  • Feeding reduced after 5 years, restock
Physical Control

- Physical or mechanical removal
- Expensive
- Somewhat effective for free floating plantings, only temporary for rooted plants
- May be only option for some sites
Chemical Control

- Must have **correct ID** to choose best product
- **Best to apply in spring**, after water at least 65F
  - Target plants present and growing
- Some are **contact**, other **systemic**
- **Pay close attention** to restrictions, labeled sites, label directions
  - Potable water, standing versus flowing water
Water Use Restrictions

- **Irrigation** (including use for preparation of agricultural pesticide sprays)
  - Range: none (Glyphosate) – 120 days (Triclopyr, Imazapyr)

- **Fishing** (consumption of fish or use for fish meal) and **Swimming** (any activity which immerses the body) – check label, most have no restrictions

- **Livestock watering**

- **Domestic drinking water supplies** (a setback distance also may apply)
Fish Kills

- Most fish kills (> 99%) due to oxygen depletion
- Fish kills caused by oxygen depletion may occur after herbicide applications when:
  - Treatment occurs too late in season
  - Too much of the weed growth treated at one time
Aquatic Herbicides

**Contact**
- Copper – algaecide
- Peroxide – algaecide
- Diquat (Reward)
- Endothall
  - Aquathol
  - Hydrothol
- Carfentrazone-ethyl (Stingray)

**Systemic**
- 2,4-D amine
- Glyphosate
- Fluridone (Sonar)
- Triclopyr (Renovate)
- Imazapyr (Habitat)
- Penoxsulam (Galleon SC)
- Imazamox (Clearcast)
So What Does It Cost?
To treat 1 acre w/ 4 ft depth:

• **Algaecides**
  - Pond Dyes (Aquashade) $35 - $44
  - Copper Sulfate $35
  - Peroxide (GreenClean Pro) $200 - $800
  - Diquat (Reward) $165

• **Emersed Weeds**
  - 2,4-D $17
  - Glyphosate $50
  - Triclopyr (Renovate) $97
  - Imazamox (Clearcast) $70 - $140
  - Imazapyr (Habitat) $144
  - Penoxsulam (Galleon) $500 – $800

• **Submersed Weeds**
  - Grass Carp $180, long term
  - Endothall (Aquathol) $680 – $1062
  - Diquat (Reward) $165
  - Fluridone (Sonar) $397-$624 - $728
Copper

- Primarily an algicide
- No Irrigation Restrictions
- Toxic to fish
- Often used in tank mixes with either diquat or endothall
- Formulations include copper sulfate pentahydrate (corrosive) and several chelated (complexed copper) formulations (better for hard water)
Peroxide Products

- A.I.: sodium carbonate per oxyhydrate
- No Irrigation Restrictions
- PAK27 and GreenClean registered
- Fast acting/ contact algaecide
- Non-toxic to fish (as labeled)
- Primarily for blue-green (planktonic) algae control
- May control other algae as well

Blue green algae, aka pea soup
Endothall

- Only effective on **submersed plants**
  - Coontail, Eurasion watermilfoil, hydrilla, parrots feather, pondweeds, brittle naiad, variable leaf milfoil
- 7-25 day irrigation restriction
- **Important differences in product:**
  - Ex: Hydrothol also controls algae, Aquathol does not
Diquat (Reward)

- **Excellent algaecide**, particularly for difficult species of algae (*Spirogyra, Pithophora*, etc.)
- 3-5 day irrigation restriction
- Fast acting, contact, non-selective
- Used extensively for control of **submersed weeds** and **duckweed** (not effective on watermeal)
- Often used in tank mixes with copper
- **Should not be applied to muddy water** or mixed in a tank with muddy water due to irreversible binding onto soil particles
Fluridone (Sonar/Avast)

- Slow acting herbicide for control of most submersed weeds and small floating weeds in ponds and lakes with minimal water exchange
- 7-30 day irrigation restriction
- Only product effective on watermeal
- Requires a long contact time – 30-90 days
- No fish kills from oxygen depletion, as plants die slowly (several weeks to several months)
- Essentially non-toxic to fish, wildlife, humans
- No algaecide properties
2,4-D

- Primarily a broadleaf herbicide used for select **submersed and emersed weeds**
- Irrigation restrictions vary
- Both liquid and granular formulations
- Inexpensive option for **water hyacinths**
- Excellent for all of the watermilfoil group (parrotfeather, variable-leaf milfoil, etc.) and for fragrant waterlily, water primrose
Primarily a broadleaf herbicide used for many select submersed and emergent weeds

120 day irrigation restriction, 0 days for established turf

Excellent for all of the watermilfoil group (parrotfeather, variable-leaf milfoil, etc.) and good for waterlily, alligatorweed, spatterdock

May be used to control brush in and around water
• Broad-spectrum herbicide applied for control of most **emergent weeds** – sprayed on foliage

• No Irrigation Restrictions

• Certain species such as waterlily and watershield may be controlled effectively, provided that there is minimal wave action to wash the herbicide off the floating leaves.

• **Do not mix in muddy water!**

• **Not effective on small, floating plants** such as duckweed, watermeal, or mosquito fern.
Imazapyr (Habitat)

- Slow acting/ systemic herbicide
- 120 day irrigation restriction
- Use in standing, flowing, and marine areas
- Wetland, riparian & terrestrial vegetation
- Best product for phragmites control
- Used to for beach vitex control
Carfentrazone (Stingray)

- New product
- Fast acting/ contact herbicide
- Good on large floating plants like water lettuce, water hyacinth, salvinia, duckweed-?, mosquito fern-?,
- Good on VL milfoil
- 1-14 day irrigation restriction
Penoxsulam (Galleon)

- New Product
- Very Expensive
- Use in hard to treat areas like swamps for root uptake to control salvinia, hyacinth, etc.
- 1 ppb irrigation restriction on most crops
- Applicators SePRO BMP authorized
Imazamox (Clearcast)

- New product
- Systemic herbicide for floating and emergent weeds
- Excellent on frogbit, salvinia, hyacinth, cattail, pickerelweed, pennywort
- Good on alligatorweed, waterlily, parrotfeather, spatterdock, watershield
- 1+ day irrigation restriction
Aquatic Weeds – Long Term Management

- Properly ID weeds
- Investigate all possible control methods for site
- Choose methods that fit weed species, water use, other considerations
- Follow Label Directions
- Prevent reinfestation, Retreat as needed