AgriLIFE EXTENSION
Texas A&M System

Aquatic Weed Management

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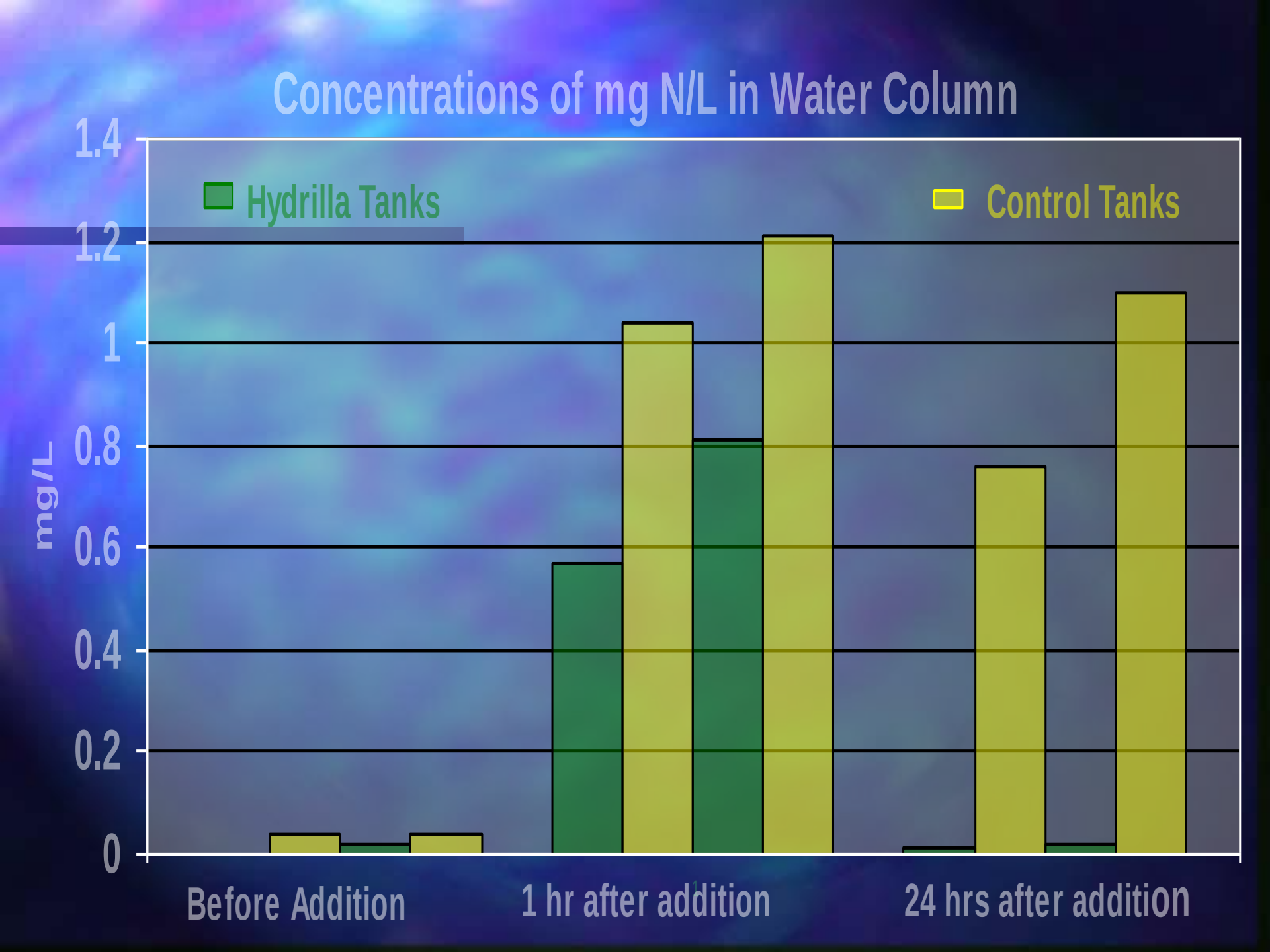
Why does aquatic vegetation become a problem in small impoundments?

- What do plants need for growth?
  - Water
  - Sunlight
  - Nutrients
- Ponds, particularly aquaculture, are nutrient sinks – accumulate nutrients from feed or fertilization over time!


Concentrations of mg N/L in Water Column
Hydrilla Tanks
Control Tanks
mg/L
1.4
1.2
1
0.8
0.6
0.4
0.2
0
Before Addition
1 hr after addition
24 hrs after addition

Why aquatic plants are so invasive?

- Propagate by:
  - Seeds
  - Fragments
  - Roots
  - Vegetative offshoots
- Tolerate flooding and drought

Alligator weed

Banana lily

Spatterdock
or Cow lily

Coontail

Aquatic Plant Management Considerations

- What plant am I treating?
- What will control or suppress the plant?
- What are the environmental consequences of the treatment?
- What water use restrictions need to be considered? (if a herbicide)
- What will be the cost of treatment?

Aquatic Plant ID

- **Algae** - primitive, non-seed baring plants and no roots, stems, or true leaves
- **Floating** - all parts of plant floats
- **Submerged** - mostly underwater, rooted with flaccid stems
- **Emergent** - stiff or rigid stems with parts standing above the water surface

Algae

- Planktonic - microscopic floating
- Filamentous - stringy or hair-like
- Macro-algaes
  - chara
  - nitella

Chara or Skunk Grass

Floating Plants

- Duckweeds
- Watermeal
- Mosquito fern (Azolla)
- Salvinia
  - common and giant
- Water lettuce
- Water hyacinth

Duckweed and Watermeal

Giant Salvinia
Non-native

Water Hyacinth

No fish or other aquatic life
YSI
85
0.14
20.8
ON/OFF
LIGHT
MODE
ENTER

Submerged Plants

- Coontail
- Eelgrass
- Egeria
- Elodea
- Fanwort
- Hydrilla
- Bushy Pondweed
- Parrotfeather
- Curly-leaf Pondweed
- Illinois Pondweed
- Sago Pondweed
- Variable-leaf Pondweed
- Eurasian Watermilfoil
- Variable-leaf Watermilfoil

Submerged Plants can be confusing

Submerged vegetation and treatment issues

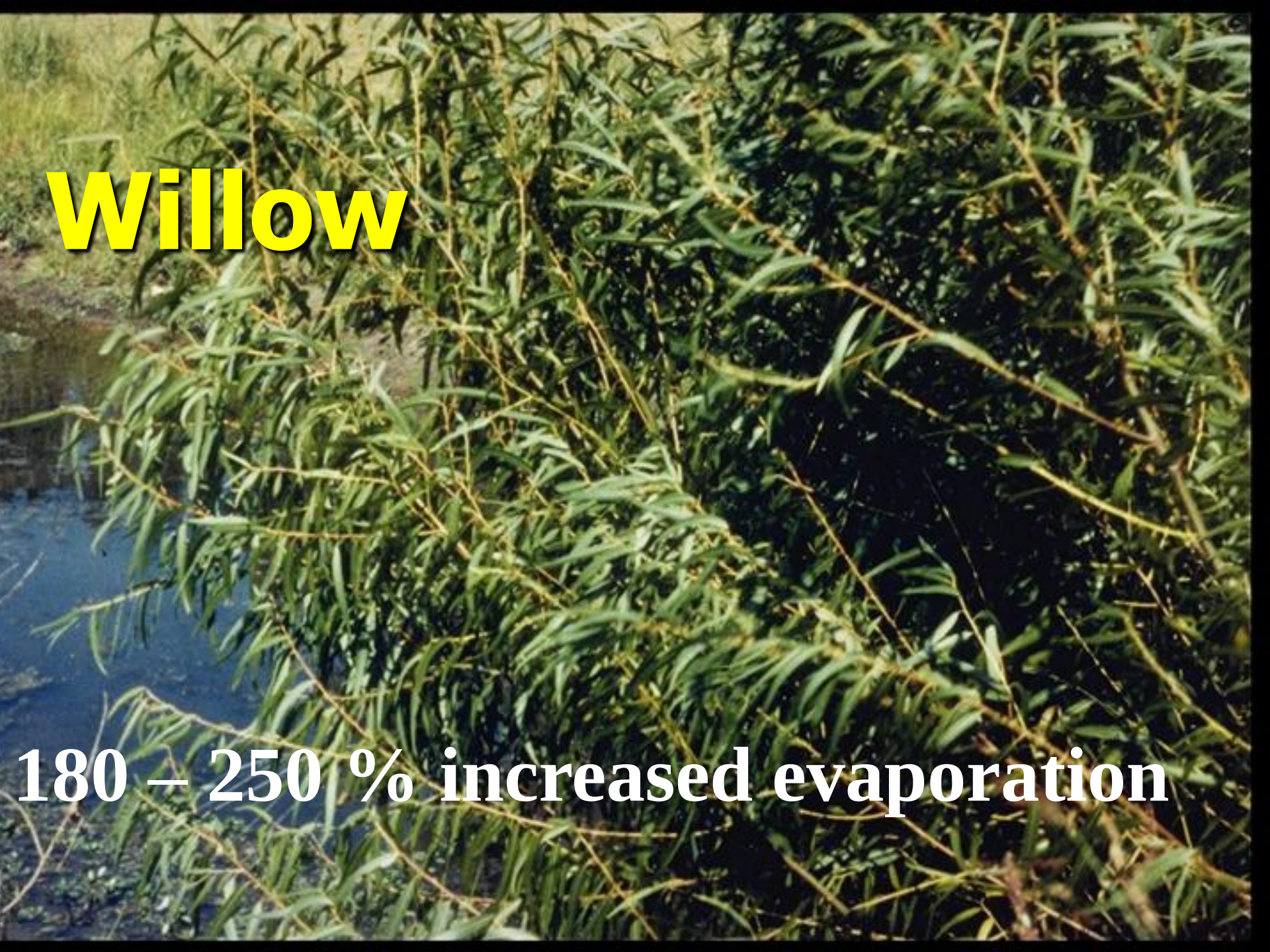
- 8 to 14 tons of vegetation per surface acre (4 – 6 ft deep)
  - This is why you must be careful with herbicide treatments!!!!!!!!!!!
  - Many tons of rotting vegetation depletes dissolved oxygen and causes fish kills!!!!!
  - Particularly with fast acting contact herbicides

Emergent Plants

- Alligator Weed
- Arrowhead
- Buttonbush
- Cattail
- Common Reed
- Giant Reed
- Horsetail
- Lizard's-tail
- Pickerelweed
- Rushes & Sedges
- Smartweed
- Southern watergrass
- Torpedograss
- Waterleaf
- Waterlilies
- Water Pennywort
- Water Primrose
- Water Shield
- Willow

Cattail

Water primrose


Willow
180 – 250 % increased evaporation

Aquatic Plant Managers Tool Box

- Prevention – fertilization and dyes or 5 grass carp/ac
- Integrated control methods
  - herbivores
  - insect biocontrol agents
  - pathogens
  - mechanical control
  - herbicides

Mechanical Control

- Frequent cutting
  - removal of cut vegetation
- Only cuts does not eliminate
- Expensive and time consuming
- "If you like mowing your yard, your going to love mowing your pond!"

Manual Mechanical Cutters

Biological Control

- Bacteria and fungi - experimental (not available to the public)
- Insects - experimental (not available to the public)
- Triploid grass carp - permit required? and escapement barrier
  - consume most submerged vegetation
  - effect control for 5-7 years (live 10-12 yrs)
- Tilapia (mortality at ±55°F)
  - consume duckweeds and filamentous algae

Herbivorous Fish

Triploid Grass Carp

White Amur

Ctenopharyngodon idella

Tilapia

"Saint Peters Fish"

Oreochromis

What is a herbicide?

- Chemical which kills or disrupts normal plant growth
- Thirteen aquatically labeled herbicides:
  - copper and complexed copper
  - 2,4-D
  - diquat
  - endothall
  - fluridone
  - glyphosate
  - penoxsulam
  - bispyribac-sodium
  - triclopyr
  - imazapyr
  - sodium carbonate peroxyhydrate
  - imazamox
  - flumioxazin

Herbicide Classifications

- **Contact**
  - immediate cell damage at point of contact
  - fast acting
  - aboveground tissue death (typically)
  - use on annual species
  - copper, diquat, SCP, endothall, and flumioazin
- **Systemic**
  - translocated throughout plant
  - slow acting
  - total plant mortality
  - use to control perennial and woody species
  - 2,4 D, fluridone, glypho-sate, triclopyr, imazapyr, imazamox, and bispyribac-sodium

Aquaculture and herbicides

- The label is the law – therefore technically only copper sulfate and diuron (catfish and HSB) are legal.
- Aquatic herbicides are labeled for: "recreational purposes…fishing"
  - Another possible interpretation is: Since recreationally caught fish can be consumed that it is therefore legal to apply to aquaculture ponds???

AQUAPLANT

A Pond Manager Diagnostics Tool

AQUAPLANT

is designed to help pond owners and their advisors in the identification and management of aquatic vegetation. Aquatic vegetation management can be a perplexing problem. The first part of that problem is proper identification. Management of most aquatic plant species depends on properly

Plant Identification

If you need assistance with identification then proceed to Plant Identification.

Management Options

If you already know the aquatic plant that needs management, then you want to proceed to Management Options.

Permits to Apply Herbicides

Under new regulations (in

B-6095
Aquatic Vegetation Identification Cards: Order this handy tool it's a palm-sized flip deck, features photographs and line drawings of 63 aquatic plants commonly found in Texas.

Look inside

Order at AgriLife Extension Bookstore

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Treatment Response of Aquatic Plants: Tables 1 and 2

Quick Plant Links

Algae

- Chara
- Filamentous Algae
- Golden Alga
- Muskgrass
- Nitella
- Planktonic Algae

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AQUAPLANT
A Pond Manager Diagnostics Tool

Plant Identification

This section of AQUAPLANT is designed to help you identify aquatic plants using photos, drawings, and descriptions. Using this section involves viewing photos and drawings of aquatic plants until you identify the plant in question.

- Alphabetical Index
- Visual Index

Aquatic plants are generally divided into four groups for management purposes. These groups are the Algae, Floating Plants, Submerged Plants, and Emergent Plants.

Algae are very primitive plants. Some algae are microscopic (planktonic algae), others are thin and stringy or hair-like (filamentous algae), while still others are large and resemble higher plants but without true roots (chara).

True **Floating Plants** are not attached to the bottom. Floating plants come in sizes from very small (duckweed) to over a foot in diameter (water hyacinth). Most have roots that hang in the water from the floating green portions.

Submerged Plants are rooted plants with most of their vegetative mass below the water surface, although some portions may stick above the water. One discerning characteristic of submerged plants is their flaccid or soft stems, which is why they do not usually rise above the water's surface.

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Watermeal

Submerged Plants

American Pondweed

Baby Pondweed

Brittle Naiad (Marine Naiad)

Coontail

Curly-Leafed Pondweed

Eelgrass

Egeria

Elodea

Eurasian Watermilfoil

Fanwort (Cabomba)

Hydrilla

Illinois Pondweed

Parrotfeather

Sago Pondweed

Southern Naiad (Bushy Pondweed)

Variable-Leaf Pondweed

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Alphabetical Index

Non-Native plants identified on this page cause extensive ecological and economic impacts in the United States. These plants should not be introduced into private or public waters and should be eliminated where possible.

- Alligator Weed Non-Native
- American Lotus
- American Pondweed
- Arrowhead (Bull Tongue)
- Baby Pondweed
- Banana Lily (Floating Heart)
- Bladderwort
- Blue Flag
- Brittle Naiad
- Bulrush
- Bull Tongue (Arrowhead)
- Bushy Pondweed (Southern Naiad)
- Buttonbush
- Cabomba (Fanwort)
- Cattail
- Chara
- Common Duckweed
- Common Reed
- Common Salvinia Non-Native
- Coontail
- Cow Lily (Spatterdock)
- Illinois Pondweed
- Lizard's Tail
- Maidencane
- Mexican Water Lily (Yellow Water Lily)
- Mosquito Fern
- Muskgrass
- Nitella
- Parrotfeather Non-Native
- Pickerelweed
- Planktonic Algae
- Sago Pondweed
- Sedges
- Smartweed (Water Pepper)
- Soft Rush
- Southern Naiad (Bushy Pondweed)
- Southern Watergrass
- Spatterdock (Cow Lily)
- Spike Rush
- Three-Square
- Torpedograss Non-Native
- Golden Alga

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Coontail
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Eelgrass

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Coontail

Ceratophyllum demersum

Description | Management Options | Photos

Description

Coontail, or sometimes called hornwort, is a dark olive-green, rootless submerged perennial plant that often forms dense colonies. Leaves are relatively stiff, whorled with many forks and small teeth along one edge. The tips of branches are crowded with leaves giving it a "coontail" resemblance. Coontail reproduces by seeds and fragmentation.

Submerged portions of all aquatic plants provide habitats for many micro and macro invertebrates. These invertebrates in turn are used as food by fish and other wildlife species (e.g. amphibians, reptiles, ducks, etc.). After aquatic plants die, their decomposition by bacteria and fungi provides food (called "detritus") for many aquatic invertebrates. The fruits of coontail are consumed by ducks and it is considered a good wildlife food.

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Management Options

Mechanical/Physical Control Options

Coontail can be removed by raking or seining it from the pond but will reestablish from any remaining fragments.

Fertilization to produce a phytoplankton or algal "bloom" prevents the establishment of most bottom rooted aquatic weeds and produces a strong food chain to the pond fish.

Non-toxic dyes or colorants prevent or reduce aquatic plant growth by limiting sunlight penetration, similar to fertilization. Aquashade, Blue Springs, and Crystal Blue are examples of non-toxic dye and other products are available. However, dyes do not enhance the natural food chain and may suppress the natural food chain of the pond.

Many types of mechanical removal devices are available that cut or chop up aquatic weeds. It is important to remember that many submerged plants regrow from fragments, so removal of cut fragments many be necessary to keep from spreading the unwanted plant. Companies that make cutters and rakes include but are not limited to Cutting Edge, Jenson Lake Mower, Midwest Aqua Care, and WeedRoller.

Physical barriers are also used to eliminate plants by shading the bottom. These work well for swimming areas, docks, etc. but must be kept clean of any buildup of sediment and

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Chemical Control Options

The active ingredients that have been successful in treating coontail include 2,4-D (G), diquat (E), endothall (E), and fluridone (E). E = excellent, G = good

Navigate and Weedar 64 are 2,4-D compounds that have been effective on coontail. 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.

Cutrine Plus, K-Tea, Captain, and Clearigate are all chelated or compound copper herbicides that can be mixed with Reward or Aquathol K to treat coontail. Other chelated or compound copper formulations are available but are not linked to on this web site.

Reward is a liquid diquat formulation that has been effective on coontail and is effective if mixed with a copper compound. It is a contact herbicide. Contact herbicides act quickly and kill all plants cells that they contact.

Aquathol K, and Aquathol Super K are dipotassium salts of endothall and comes in both liquid and granular formulations. These endothall products have been effective on coontail and can be mixed with copper compounds for additional effectiveness. Contact herbicides act quickly and kill all plants cells that they contact.

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Reward® Landscape and Aquatic Herbicide

Herbicide

What is it? | How To Use | Label | Stewardship | More Info

What is it > Overview

With REWARD® Landscape and Aquatic Herbicide Herbicide, you never have to wait for aquatic weed control. A non-selective, highly active contact material, REWARD spreads quickly through the water and makes fast contact with aquatic weeds. Water-soluble, it is absorbed by target plants in just minutes, providing broad-spectrum control of floating, submersed and marginal weeds. With such outstanding control, there is never any worry about groundwater contamination or toxicity to fish, other organisms or wildlife. For no-wait control without the worry, REWARD is the herbicide for your aquatic weed management program.

Fast Action

- Highly active, non-selctive
- Broadest-spectrum aquatic herbicide available
- Easy on the environment
- Ideal for integrated plant management
- Low use rates
- Convenient packaging

Product Highlights:

- Fast acting
- Eliminates the need for costly hand-weeding
- Low use rates
- Manages weed problems in aquatic, grounds maintenance and landscaping areas

News

1/18/2010 Reward Landscape and Aquatic Herbicide

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Reward®

Landscape and Aquatic Herbicide

TO PREVENT ACCIDENTAL POISONING, NEVER PUT INTO FOOD, DRINK, OR OTHER CONTAINERS, AND USE STRICTLY IN ACCORDANCE WITH ENTIRE LABEL.

DO NOT USE THIS PRODUCT FOR REFORMULATION.

Active Ingredient:	
Diquat dibromide [6,7-dihydrodipyrido (1,2-a:2',1'-c) pyrazinediium dibromide]	37.3%
Other Ingredients:	62.7%

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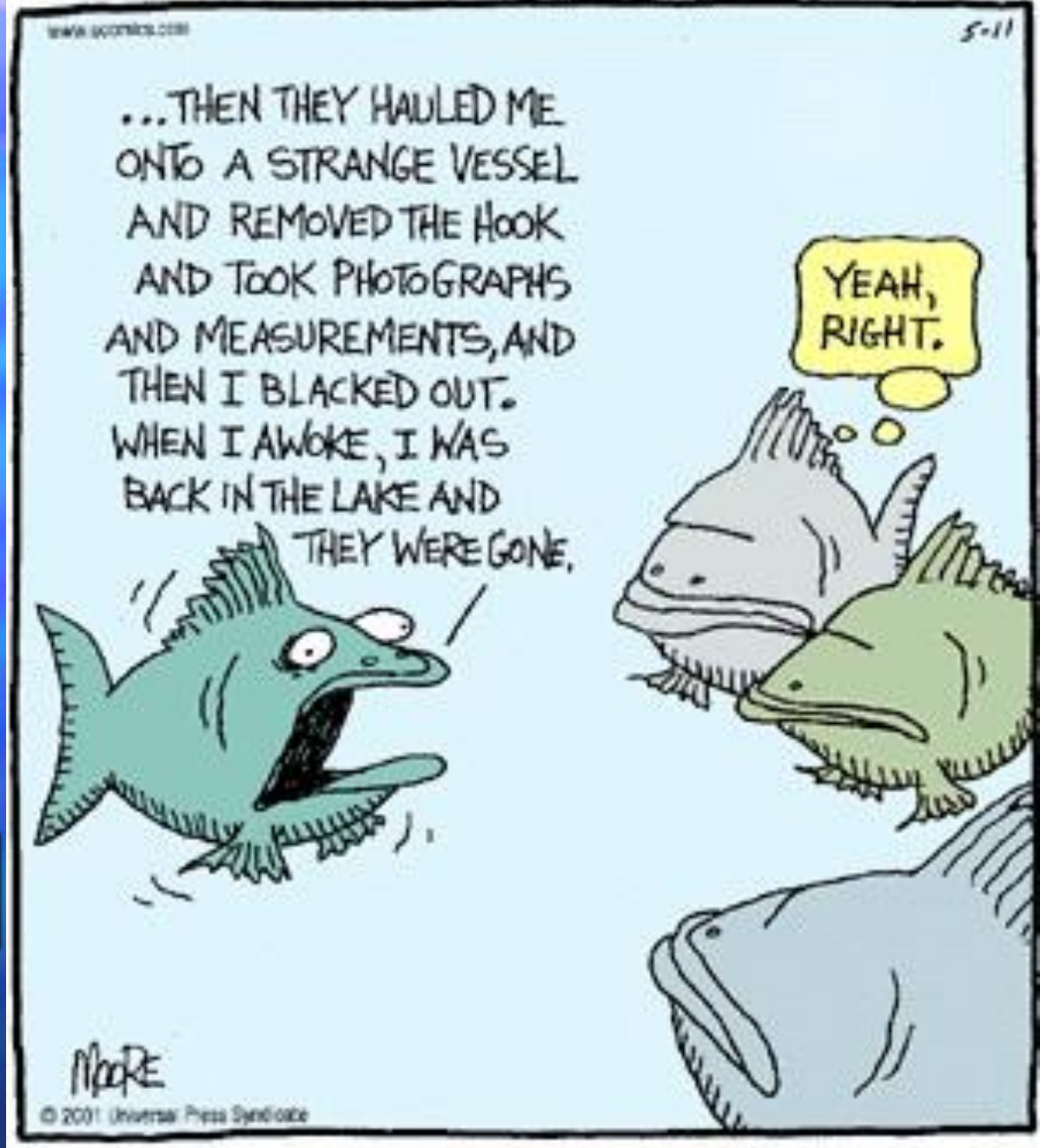

Raymond the Lunatic and his far-fetched tale of alien abduction.