**CDA Aquatic Noxious Species**

- **A List**
  - Hydrilla
  - Giant Salvinia
- **B List**
  - Eurasian watermilfoil

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**Eurasian Watermilfoil**

- Only aquatic species on the Noxious Weed List found in Colorado
- Occurs in most western states
- Submerged perennial with an annual growth habit
- Grows in waters up to 20 feet deep, but most abundant between 3 and 12 feet
- Reproduction through fragmenting, after flowering
- Has no overwintering structures, is essentially evergreen
- Fragments easily transported between water bodies

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**Eurasian Watermilfoil**

- Can quickly colonize ponds, lakes, and irrigation canals
- Most commonly found in shallow ponds
- Also found in irrigation canals
- Will form very dense mats
- Commonly found in monoculture stands, often misplacing native and desirable species

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**Outline**

- Aquatic Plant Species
  - Noxious weed species
  - Other species
- Problem Species
  - Eurasian watermilfoil
  - Sago pondweed
- Aquatic Weed Control Methods
**Eurasian watermilfoil**

- Negative impacts on:
  - Recreation—Fishing, swimming, boating, etc...
  - Water delivery
  - Habitat—Mats can lead to a reduction in dissolved oxygen

**Other Common Aquatic Plants**

- Sago pondweed
- Horned pondweed
- Curlyleaf Pondweed
- Native Milfoils
- Coontail
- Common Elodea
- Chara

**Sago pondweed**

- Native submersed perennial
- Thrives in flowing water
- Reproduction and overwintering through tubers
- Can form tubers up to 18 inches deep
- Leaves are alternate
Sago pondweed infestation near Platteville, CO

Horned pondweed
- Annul submerged species, acts as an annual where water is seasonal (irrigation canals)
- Spreads through seeds as well as creeping rhizomes
- Long slender leaves
- Looks very similar to sago pondweed, but has “horns” at each node
- Leaves are opposite

Curlyleaf pondweed
- Wider leaves than Sago pondweed
- Does produce seed, but main means of reproduction are through turions and fragments
- Turions allow plants to over-winter
- Has leaves that are 2-3” long that have leaf margins that are “wavy”

Native Milfoils
- Northern milfoil
- Very similar in growth habit to Eurasian watermilfoil, can hybridize with EWM
- Although native, can still form dense stands and be troublesome
- One way to distinguish between species is by leaflet number
  - Eurasian usually has 12 or more pairs of leaflets per leaf
**Native Milfoils**

- Distinguish by:
  - Leaflet Number
  - Apical Tip Shape
  - Leaf Tip Shape

**Coontail**

- Submerged species with no roots
- Has a free floating life form
- At first glance can resemble a milfoil species

**Common elodea**

- Occurs as a submerged perennial species
- Has long, slender stems with 3-4 leaves at each node
- Can sometimes be confused with hydrilla

**Hydrilla**

- Whorls of 4-8 (most 5)
- Toothed margins
- Toothed midrib
- Larger leaves

**Elodea**

- Whorls of 3 (or 4)
- Smooth leaves
- Smaller leaves

**Coontail**

- European submersed perennial species
- Toothed midrib
- Smaller leaves

**Eurasian Watermilfoil**

- Native milfoil species
- Has long, slender stems with 3-4 leaves at each node
**Chara**

- Resembles a vascular plant, but is actually an algae
- Are anchored to the sediment by root-like structures
- Have whorls of branches at each node
- Can also be identified by a skunklike odor when branches are crushed

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**Control Methods For Aquatic Species**

- Mechanical
  - Rotovation
  - Aquatic harvester
  - Dredging
- Biological
- Physical
  - Benthic barrier
  - Hand pulling
- Chemical
  - Contact herbicides
  - Systemic herbicides
- Application methods

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**Mechanical Control**

- Rotovation
  - Basically works as an underwater rototiller
  - Can provide temporary control
- Aquatic harvester
  - Cuts off plants 2-3 feet below the water surface
  - Can provide re-infestation if not all fragments are collected
- Dredging
  - Mechanically digging out plants or diver dredging
  - Very time consuming and expensive
### Control Methods

- Mechanical
  - Rotovation
  - Aquatic harvester
  - Dredging
- Biological
- Physical
  - Benthic barrier
  - Hand pulling
- Chemical
  - Contact herbicides
  - Systemic herbicides
- Application methods

### Contact Herbicides

<table>
<thead>
<tr>
<th>Herbicide</th>
<th>Use Rates</th>
<th>Exposure Time</th>
<th>Selectivity</th>
<th>MOA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clearigate/Nautilique/ Copper chelate</td>
<td>Up to 1 ppm</td>
<td>hours to 1 day</td>
<td>Broad Spectrum</td>
<td>Unknown</td>
</tr>
<tr>
<td>Cascade/Teton Endothall</td>
<td>Up to 5 ppm</td>
<td>hours to days</td>
<td>Depends on Rate</td>
<td>Unknown</td>
</tr>
<tr>
<td>Reward® Diquat</td>
<td>Up to 1.5 ppm</td>
<td>hours to days</td>
<td>Broad Spectrum</td>
<td>PS I</td>
</tr>
<tr>
<td>Stingray</td>
<td>Up to 0.2 ppm</td>
<td>hours to days</td>
<td>Selective</td>
<td>PPO</td>
</tr>
<tr>
<td>Clipper</td>
<td>0.1-0.4 ppm</td>
<td>Hours to days</td>
<td>Selective</td>
<td>PPO</td>
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</tbody>
</table>

### Systemic Herbicides

<table>
<thead>
<tr>
<th>Herbicide</th>
<th>Use Rates</th>
<th>Exposure Time</th>
<th>Selectivity</th>
<th>MOA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Navigate* 2,4-D ester</td>
<td>0.5 - 3.0 ppm</td>
<td>hours to days</td>
<td>Selective</td>
<td>Auxinic</td>
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<tr>
<td>Renovate® Triclopyr</td>
<td>0.75 - 2.5 ppm</td>
<td>hours to days</td>
<td>Selective</td>
<td>Auxinic</td>
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<tr>
<td>Rodax® Glyphosate</td>
<td>N/A</td>
<td>not for submersed</td>
<td>Non-selective</td>
<td>EPSPS</td>
</tr>
<tr>
<td>Habitat® Imazapyr</td>
<td>N/A</td>
<td>not for submersed</td>
<td>Non-selective</td>
<td>ALS</td>
</tr>
<tr>
<td>Sonar® Fluoridane</td>
<td>10 - 90 ppb</td>
<td>45+ days</td>
<td>Selective</td>
<td>Pigment</td>
</tr>
<tr>
<td>Galion Penoxasol</td>
<td>5 - 15 ppb</td>
<td>45+ days</td>
<td>Selective</td>
<td>ALS</td>
</tr>
<tr>
<td>Clearcast Imazamox</td>
<td>50 - 500 ppb</td>
<td>14+ days</td>
<td>Selective</td>
<td>ALS</td>
</tr>
<tr>
<td>Tradewind Bispyracb</td>
<td>20 - 45 ppb</td>
<td>45+ days</td>
<td>Selective</td>
<td>ALS</td>
</tr>
</tbody>
</table>

### Chemical Control

- Things to consider when choosing an aquatic herbicide:
  - Required exposure time
  - Selectivity
  - Potential non-target effects
  - Potential irrigation restrictions
  - Potential drinking water restrictions
  - Water flow
Chemical Control

- In order to obtain control you must:
  - Correctly identify the species
  - Use the correct product
  - Apply at the correct time
  - Maintain the required concentration
  - Keep that concentration for the required exposure time
- Also keep in mind resistance management
  - Rotate MOA’s
  - Combination treatments

Example: Algae Control

- Herbicide Application Methods

Planktonic Algae
(0 DAT)

- Clarity 33 inches
- Temp 26.4 C
- DO 7.8 mg/ml

3 DAT
(July 5)

- Clarity 54.5 inches
- DO 6.9 mg/l

14 DAT
(July 17)

- Clarity 80 inches
- DO 6.7 mg/l

In order to obtain control you must:
- Correctly identify the species
- Use the correct product
- Apply at the correct time
- Maintain the required concentration
- Keep that concentration for the required exposure time
- Also keep in mind resistance management
  - Rotate MOA’s
  - Combination treatments
Injection Treatments

Foliar Applications

Granular Application

For More Information

Available at: www.aquatics.org

Questions?

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Phragmites Control
Phragmites (Common Reed)

- Both native and non-native biotypes are present in the U.S.
- Non-native biotypes were likely introduced from Europe in the 1800's.
- In general, the non-native biotypes are the only ones that are invasive.
- Cornell University has developed a key to identify both biotypes.
- Visual identification is no foolproof and genetic analysis is the only reliable way to identify which biotype is present.

Phragmites Control

- Mechanical
  - Mowing
  - Burning
- Chemical
  - Garlon (triclopyr) – Selective
  - Clearcast (imazamox) – Selective
  - Habitat (imazapyr) – Non-selective
  - Rodeo (glyphosate) – Non-selective

Phragmites

- Perennial grass
- Can reach 10-12’ tall
- Forms monotypic stands
- Reproduces through seeds, stolons, and rhizomes
- Can displace native species and reduce habitat quality

Flowering Rush

- Butomus umbellatus
- Green leaves are triangular in cross section
- Leaf tips may be spirally twisted
- Flowers borne in umbels, each with up to 30 flowers
- Flowers are about ½-inch wide and each bears six pinkish-white tepals
- Plants are strongly rhizomatous
Look for triangular stems with a “twist”, usually in water less than 8 feet deep.

Flowers and umbels

Reproduces by:
- Seed
- Vegetative bulblets in inflorescence
- Vegetative bulblets from rhizomes
- Rhizome fragments

Three growth forms: terrestrial (shoreline), emergent, and fully submersed

Dry Canal Treatments
Flowing Water Treatments