NC STATE UNIVERSITY

Aquatic Weed Management

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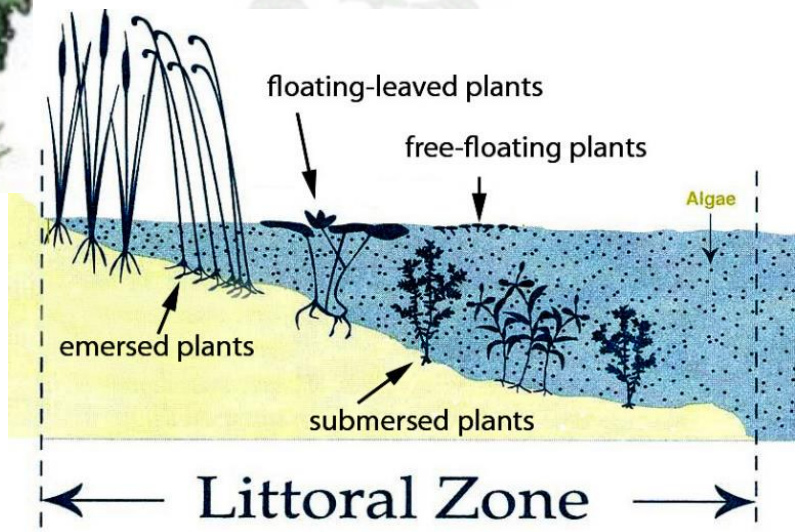
Aquatic Plant Management

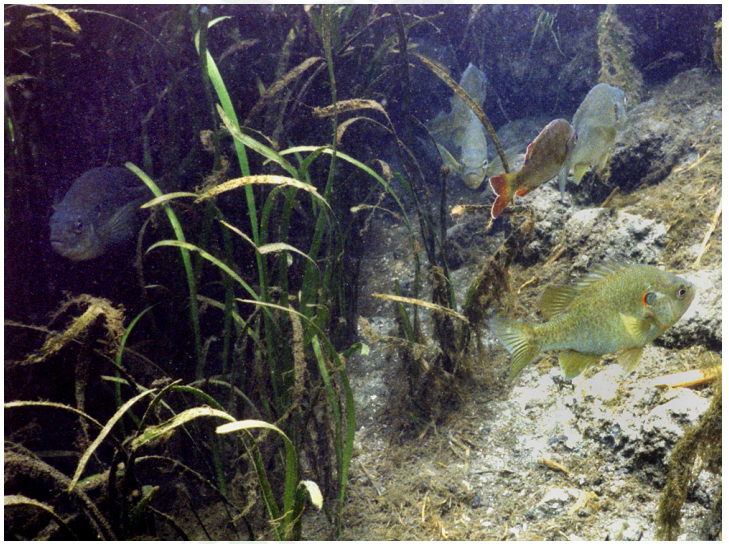
Aquatic Plants

- Free-floating
- Floating-rooted
- Submersed
- Emergent
- Riparian



Benefits of Aquatic Plants

- Food, shelter, and breeding habitat for fish and wildlife
- Protection from erosion
- Oxygenation of water
- Aesthetics



How Do Aquatic Plants Spread?

- Human activities (wildlife plantings, boating, fishing enhancement, aquarium dumping, water gardens, dredging, mechanical harvesting)
- Animals (wading birds, aquatic mammals)
- Water movement
- Transport by wind and rain (seeds, spores)


BIRD SHOALS
TRADING CO.
BIRD SHOALS
AQUATIC NURSERY
Pond Plants & Products
105
CHANNEL
ROCK ROAD
OPEN

1	remove	Anacharis-XLG FORM	1	$2.49	$2.49
2	remove	Egaria najas	1	$1.98	$1.98
3	remove	Cabomba, Green	1	$1.58	$1.58
4	remove	Glossostigma	6	$1.98	$11.88
5	remove	Parrot's Feather	2	$0.98	$1.96
6	remove	Brazilian Pennwort	1	$1.98	$1.98
7	remove	Rotala, Indica	2	$0.98	$1.96
8	remove	Temple Plant	1	$1.98	$1.98
9	remove	Water Velvet or Salvinia	1	$6.99	$6.99
10	remove	Floating Heart	3	$2.98	$8.94
11	remove	Snowflake, Large White (loose)	3	$6.99	$20.97
12	remove	Water Hyacinth	1	$0.00	$0.00
13	remove	Water Lettuce	1	$1.98	$1.98
14	remove	Water Poppy	3	$2.99	$8.97
15	remove	Aquatic Morning Glory	3	$4.59	$13.77
16	remove	Golden Mystery Snail	1	$1.99	$1.99
17	remove	Apple Snail	1	$3.99	$3.99
18	remove	Giant Striped Colombian Ramshorn Snail	1	$1.79	$1.79
19	remove	Mosaic Plant	1	$4.99	$4.99
				Subtotal:	$100.19

Why Are Some Aquatic Plants Invasive?

- Large areas of clear, shallow water
- High levels of nutrients, especially N and P
- No natural enemies (introduced weeds)
- Characteristics which make them more competitive than native plants
  - Adapted to low light or CO_2
  - Adapted to intense sunlight and high temperatures

Why Control?


Hydrilla at Wakulla Springs, Florida
Hydrilla verticillata
Photo by Vic Ramey
Copyright 1998 Univ. Florida

Why Manage Aquatic Weeds?

- Irrigation
- Drainage
- Flood control
- Water supplies
- Power generation
- Aesthetics
- Aquaculture
- Transportation
- Mosquito control
- Fishing/Recreation

Why Manage Aquatic Weeds?

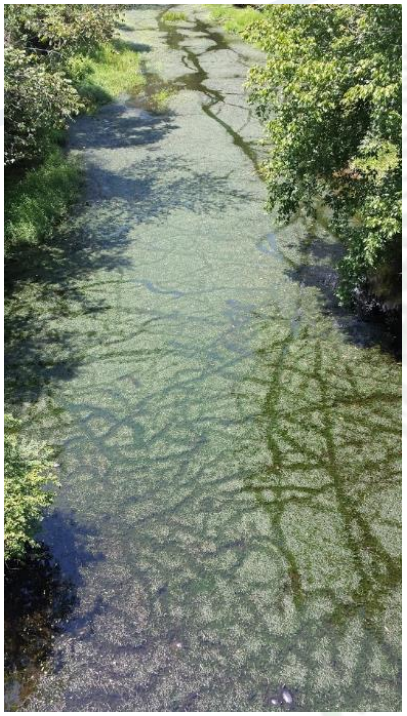
- Prevent/reduce impacts to multi-purpose reservoirs

Why Manage Aquatic Weeds?

- Limit ecological damage from invasive species

Giant Salvinia in a NC Pond

Hydrilla controlled in the Eno River



Alligatorweed in drainage ditch

S. H. Kay, NCSU, 1989

Hydrilla in Impoundments / Lakes

Yellow Floating Heart


Mosquito
© N.P.C.A.

Formulating Weed Management Decisions

- Use of the body of water
  - Irrigation, consumption, livestock, etc.
- Plant identification
- Fish and wildlife populations
- Water quality
- Physical, environmental, and economic limitations

Approaching Management

- There is no silver bullet or "one-size fits all" approach
- Every waterbody is distinct and each needs to be clearly defined
  - Natural systems are more complex than impoundments
  - Impoundments are inherently artificial
- What are goals?
- Eradication is a big word with promises attached
- Technical advisory committees are very helpful
  - Due diligence
- Public input is necessary for many systems
- Public outreach is necessary for all systems

Linking Plant Biology to Management

- Each weed species will have different biological characteristics regarding growth, reproduction, etc.
- Management techniques need to reduce growth and interfere with reproduction
- Poor timing can make management fail
- Tools that look good in the short term may not hold up on a year to year basis

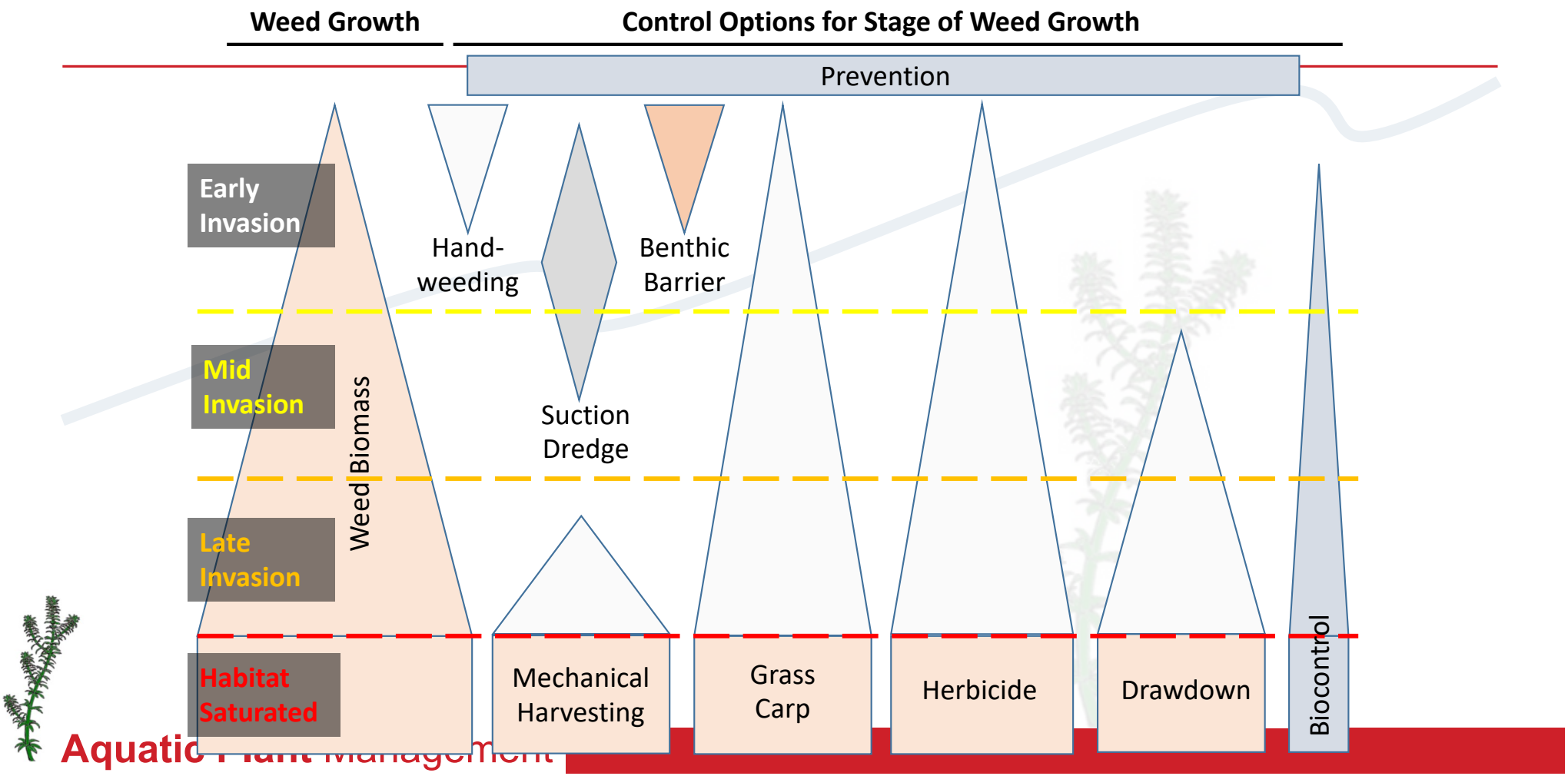
Linking Plant Biology to Management

- Species that produce propagules are more difficult to manage than those that don't
- Hydrilla may require 10 years of treatment to deplete the turion bank
- Egeria / Lagarosiphon do not produce seed or turions
- Understanding species biology is important for targeting sensitive areas in the life cycle

Control Options

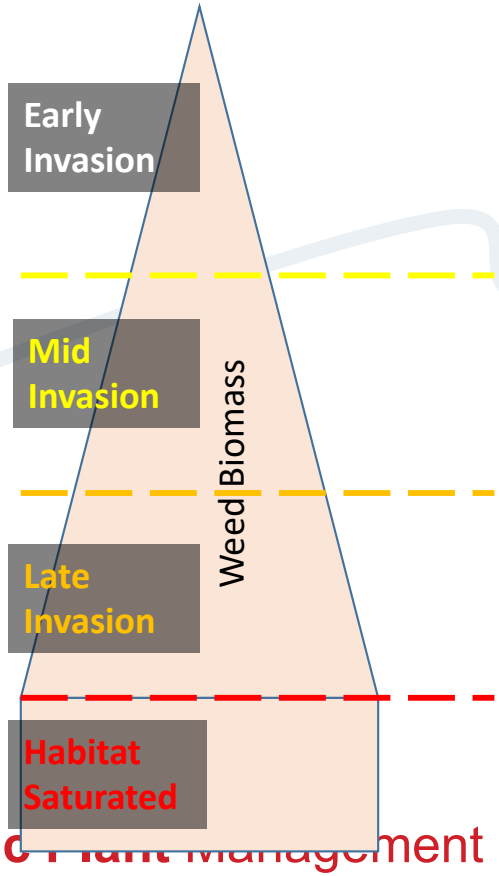
- Prevention
- Cultural
- Mechanical/Physical
- Biological
- Chemical

Selecting Control Options



Selecting Control Options

Weed Growth | **Control Options for Stage of Weed Growth**



Prevention

- Often too late…

Selecting Control Options

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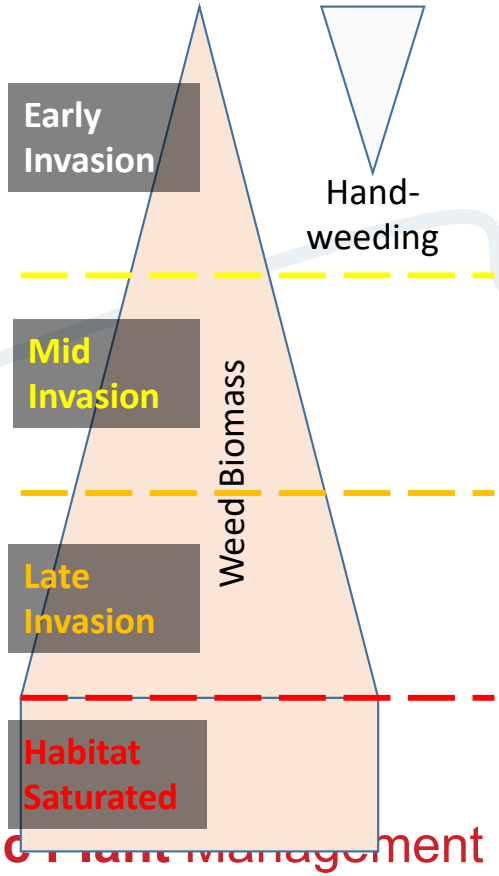
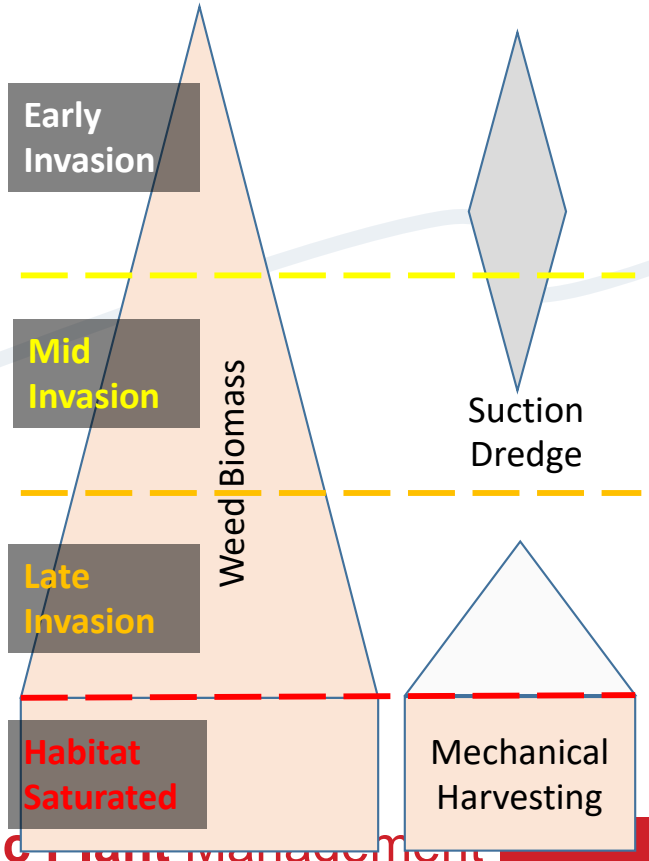


Handweeding

- Most common management form
- Generally for special situations with no other options
- Highly labor intensive/inefficient
  - Aquatic plants may be up to 98% water
  - Volunteers are cost effective, but limited
    - Liability: back injury, risk of heart attack or stroke
- Plants may reproduce as fast as removed
- Pulling will disturb soil and may disturb native species

Selecting Control Options



Mechanical Techniques

- Short term control only
- Produces many fragments than can spread infestation
- Can be very destructive to non-target species
- Can you access all areas?
- Not always viable

Selecting Control Options

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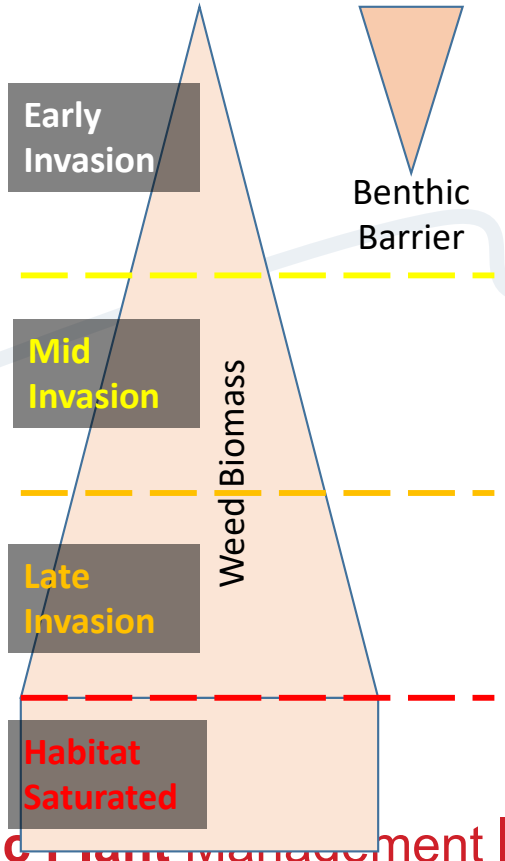
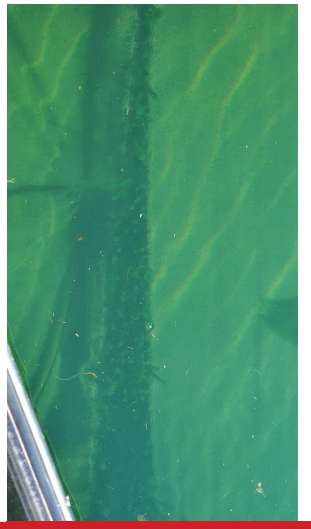


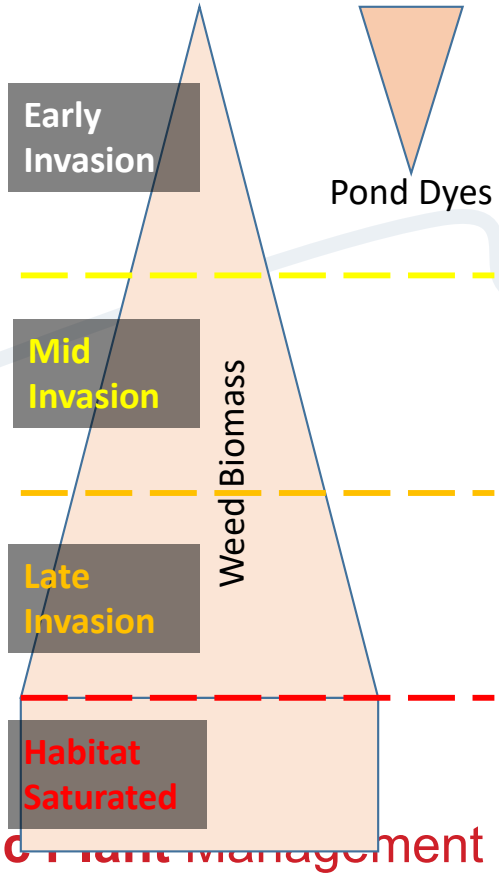
Benthic barrier

- Woven fabric placed along sediment
- Prevents weed growth from sediment
- Ineffective once sediment deposits on top
- Used on flat bottoms
- Impacts to non-target organisms?
- Not selective



Selecting Control Options

Weed Growth | **Control Options for Stage of Weed Growth**

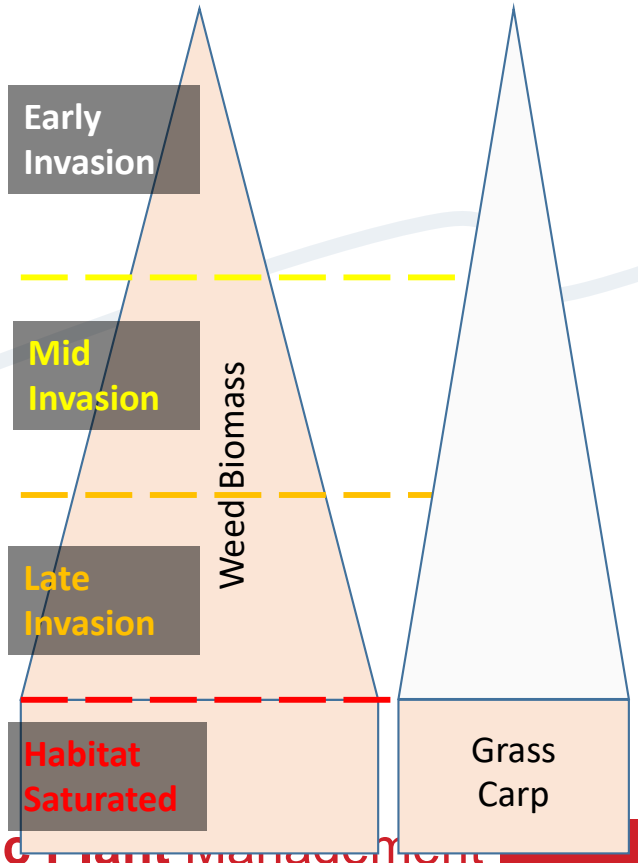


Pond dyes

- Work by blocking sunlight
- Not effective on vegetation within 18” of waters surface
- Must be applied early season
- Concentrations must be maintained
- Water flow reduces effectiveness

Selecting Control Options

Weed Growth **Control Options for Stage of Weed Growth**



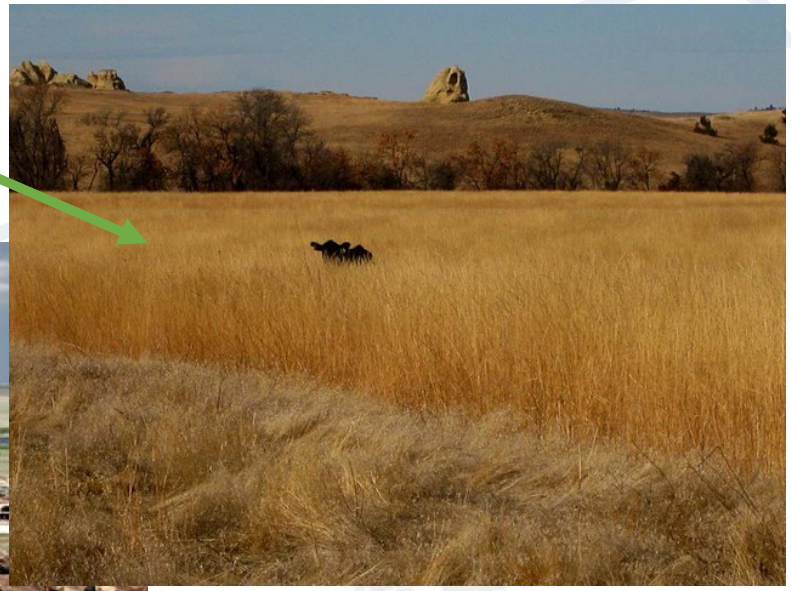
Triploid Grass Carp

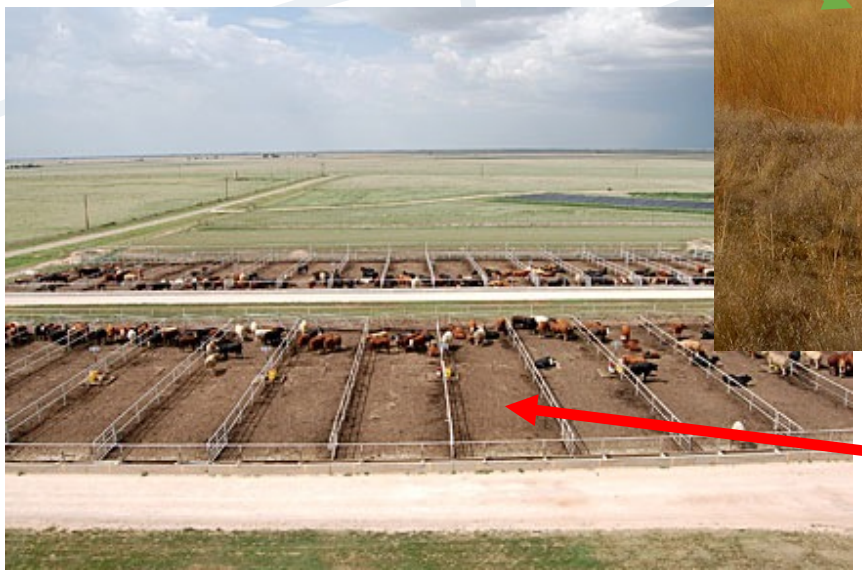
- Introduced from Asia
- Sterile version may be stocked
- Permits may be needed; will not be permitted in all waterbodies
- Feeds on plants only
- Generally a non-specific herbivore although they do like hydrilla
- Do not prefer to eat milfoils
- Stocking rates based on past experience

Grass Carp's Closest Living Relative

Overstocking vs understocking

Understocking, no impact on vegetation





Overstocking, no vegetation