Aquatic Weed Management: Biological Control

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Aquatic Weed Control

- Types of control
  - Physical – Pond design or weed removal
  - Chemical - Herbicide
  - Biological – Shading, Grass Carp, beetles, wasps, viruses

Pond Design can reduce weed growth

- Eliminate shallow areas
  - Survey water line before construction
- Reduce water outflow
  - Build out of channel or divert water
- Three sides open to wind
  - Clear timber inside and out of pond
  - Trees in pond are substrate for weeds
- Minimum 3 feet deep in dry weather

Stocking Grass Carp Triploids

Pond Condition	Number per Acre	Comment
New pond	5	Can stock smaller size, Less than 8 inches
Before weeds begin to grow	5 to 10	Use 12 to 14 inch carp if bass are present
Existing weed bed	20 to 40	Use lower rate with herbicide burn-back
Filamentous algae is present, or duckweed	Up to 50	Rapid growth of plant reduces control effect

Prevent escape by installing spillway fences and overflow screens.

Grass Carp Size at Stocking

- For new ponds can use 3-8 inch carp ($5 to $10.00 each)
- For ponds with large bass (3 lb or larger) and weed infestations use 1 pound carp ($10.00 to $15.00 each)
- Grass carp less than 12 inches are prone to being eaten by largemouth bass. (It will happen.)

One Pound and 14 inches

Limits of Grass Carp

- Effective for about 6 years
- **Large carp do not eat aggressively**
- Grazing is a slow control method
- Heavy grass carp stocking can interfere with bream spawning activity
- Try stocking a portion of your grass carp each year

Grass Carp Stocking Example

- 25 acre pond with heavy weeds in 25% of area
- Want 20 grass carp per acre of infestation or 6.25 x 20 = 125
- Treat infestation and stock 50 grass carp
- Second, third and fourth year stock 25 grass carp per year

- Re-evaluate during 5^{th} year, 6^{th} and 7^{th}

Grass Carp Feeding

- Weed is sucked into the mouth
- Must be soft enough to swallow
- Teeth are in the throat
- Grass carp cannot "bite off" stems

Photo by Keith Sutton.

A Comparison of Fish Populations Before and After Extensive Grass Carp Stocking

- **Almost no effect** upon total standing crop, shad biomass, numbers of catchable largemouth bass, sunfish, and crappie, or numbers of young-of-the-year sunfish and bass.
- **Improve the condition factor** of largemouth bass, bluegill, and redear sunfish.

Lake Conroe Debate

- Stocked Grass Carp to remove hydrilla
- 1980 to 1983 most hydrilla eaten
- 1983 to 1986 increase productivity
- 1986 nutrients back to pre-1980
- 1988 to 1993 catch per unit effort increases

Lake Conroe Now

- Return of aquatic macrophytes
- Bass fishermen seem to like it
  - Say larger bass are present
- Home owners want more grass carp
  - Access to lake front is degraded
  - Hydrilla is coming back at the expense of the natives that were planted

What is Real

- Macrophytes are reduced in the presence of grass carp
- Grass carp have a 5 to 6 year useful life
- Release of plant nutrients is short term
- Management of pond or lake productivity involves more than macrophyte removal
- Consider Long Term cost/benefits

Short Term GC Effect on Bream

- 19 month trial, in ¼ acre ponds
- Initial 1,500 bluegill, 100 bass/acre
- 52% reduction in bluegill standing crop
- No reduction in bass standing crop

- What does this mean?

Grass Carp and Pond Fish

- Grass carp may disturb bream spawning in shallow ponds
- Reduced weeds as cover allows bass predation of bream
- Grass carp do not eat a significant amount of fish, if any
- Grass carp will eat fish food pellets

Other biological controls

- Usually for large-scale projects
- Alligator weed flea beetle, thrips and stem borer
- Water hyacinth weevils, moth
- Water lettuce weevils, moth
- Hydrilla weevils, leaf mining flies, moth
- Salvinia weevil

Alligatorweed Flea Beetle

- Pre release, 1963, 97,000 acres of problem alligatorweed
- 1981, less than 1,000 problem acres of alligatorweed-Source: Dept of Entomology, Texas A&M
- Alligatorweed continues to infest ponds, lakes, and streams in Georgia

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Water Hyacinth Insects

- Weevils
- *Neochetina eichhorniae* and *N. bruchi*
- Released in the 1970's
- Moth: *Niphograpta albiguttalis*

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Hydrilla Insects

- Tuber weevil
- Works during lake drawdown
- Released in 1987 but did not establish
- *Bagous affinis*
- Other insects under study

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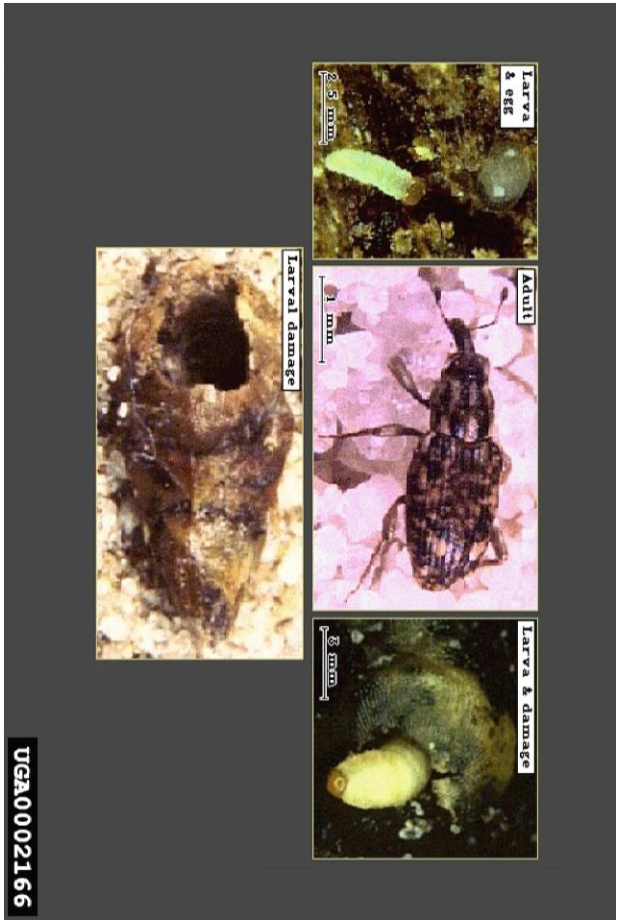

Azolla Insects

- Azolla weevil for *Azolla caroliniana, Azolla pinnata, Azolla filiculoides* control
- Native to North America (S and SW United States)
- *Stenopelmus rufinasus*

Salvinia Insects

- Salvinia weevil is in the Georgia area
- Cool weather limits the northern advance of this insect
- Aggressive stocking may be needed

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Drawdown in Winter

- Drop pond water level to expose shallow areas (large pond option)
- November, December, January
- **Do not do this in warm weather**
- Can apply herbicides to exposed plants
  - Dichlobenil
  - Rodeo
  - Galleon

Resistant to Drawdown

- Bladderwort, Hydrilla, Illinois pondweed, Chara, Variable leaf milfoil
  - Have drought resistant seeds, rhizomes, etc.
- Alligatorweed, Arrowhead, Bulrush, Maidencane, Pickerelweed, Smartweed, Spikerush, Water Hyacinth
  - Marginal or floating plants

Effects of Summer Drawdown

Reducing Light Availability

- Chemical dyes
  - Work but also limit fish food organisms
- Shade cloth
  - 50 to 75% shade needed
- Fertilization of “bloom”
  - Pond must be 3-4 feet deep at minimum
  - An on-going program must be maintained

The “Bloom”

- Algae, phytoplankton, that shade the pond bottom by absorbing light
- Established by using a fertilization program
- Not always possible to establish bloom or keep other plants from growing, using the added fertilizer

Concerns Related to Fertilization

- Low oxygen levels
  - Use the correct amount of fertilizer
  - Install aerator
- Costs of the product
  - Apply efficiently
- Greater variation in daily oxygen and pH levels
  - Install aerator
- Increased aquatic vegetation
  - Stock grass carp to prevent unwanted growth of plants

Integrated Aquatic Plant Management

1. Identify intended uses and plants that hinder these uses
2. Understand the plant ecologies
3. Set management goals
4. Consider management methods
5. Develop an Action Plan
6. Use a long term education program

Conclusion

- Combine biological, mechanical, and chemical control
- Use only labeled chemicals
- Use the Extension resources for identification and control options
- Begin controls early