

SNAIL MANAGEMENT IN CULTURE PONDS



ROLE IN LIMITING GRUB ISSUES

BIOLOGICAL PROFILE

- **Internal parasites (endoparasites)**
- **Varying size, shape, and habitat**
- **Complex life cycles**
 - involving several hosts
 - both sexual and asexual reproduction within these hosts
- **Actively or passively invade**

EFFECTS

- **Most grubs not a serious threat to fish health**
- **Presence undesirable**
 - Anglers
 - Producers
 - Consumers

LOCATED IN MIDWEST

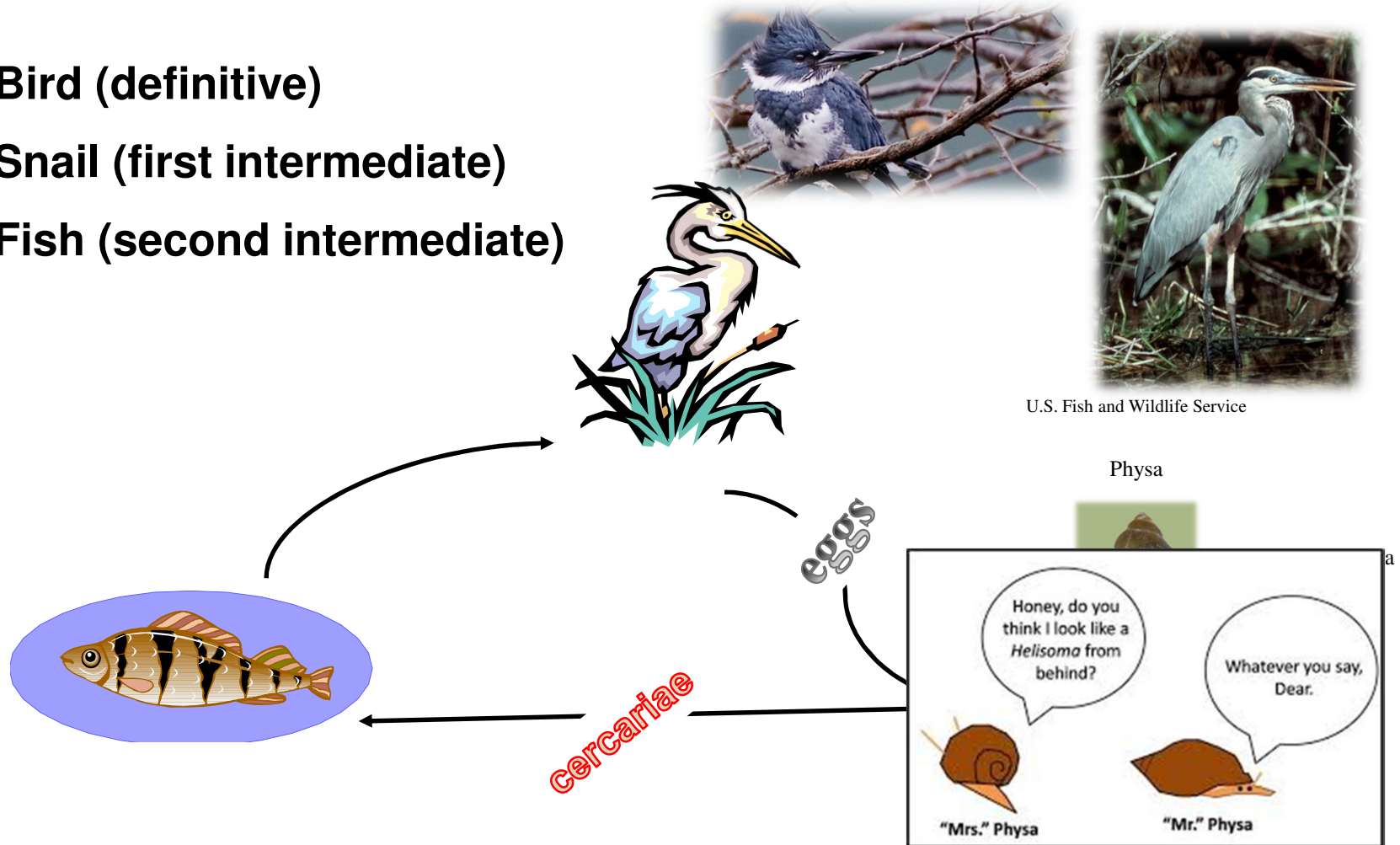
- Commonly seen in ponds
 - Black grub (*Uvulifer ambloplitis*)
 - White grub (*Posthodiplostomum minimum*)
 - Yellow grub (*Clinostomum complanatum*)



Photo credit: Bill West, Blue Iris Fish Farm

GENERIC LIFE CYCLE

- Bird (definitive)
- Snail (first intermediate)
- Fish (second intermediate)



U.S. Fish and Wildlife Service

Physa

a

BLACK GRUB

- **Black spot disease**
 - Pinhead-sized spots
 - 2 mm, 2/32 in
 - skin, tail, fins, musculature
 - Effected species
 - Sunfish (*Lepomis* spp.)
 - Black bass (*Micropterus* spp.)
 - Crappie (*Pomoxis* spp.),
 - Yellow perch (*Perca flavescens*)

Live in fish for 4 years

EFFECTS

Undesirable appearance



Photo credit: Parasite and Disease Section, Dept. of Fisheries and Allied Aquacultures, Auburn University



Photo credit: Michigan Department of Natural Resources

WHITE GRUB

- **Often overlooked by both anglers and producers**
 - Size (1 mm or 1/32 inch)
 - Location (kidneys, liver, heart)
- **Pond strains**
 - *P. minimum centrarchi* (sunfish)
 - *P. m. minimum* (minnows)

EFFECTS

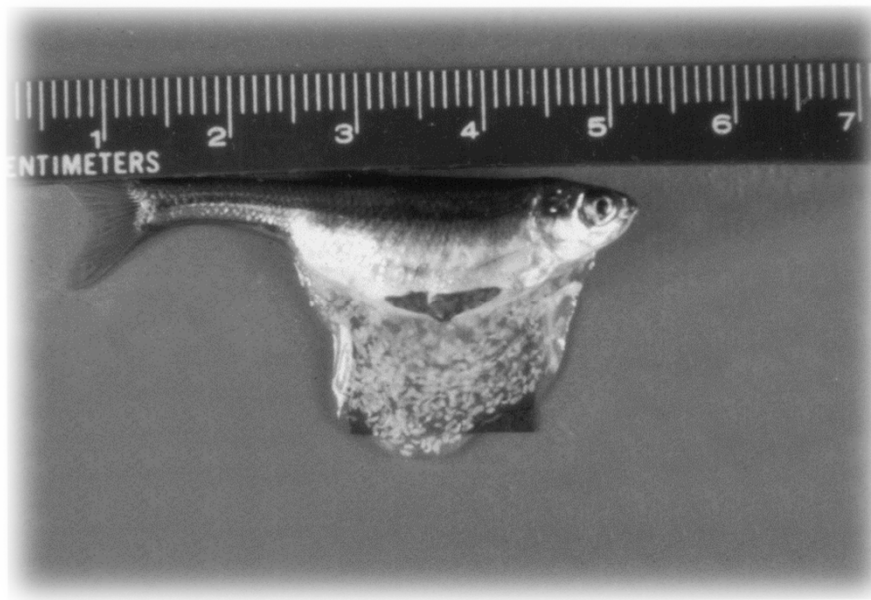


Photo credit: Andrew J. Mitchell, USDA/ARS, Stuttgart, AK

YELLOW GRUB

- **Common parasite in North America**
 - Size (3 to 8 mm or 1/8 to 1/4 inch)
- **Visible after skinning or filleting**
- **Affect**
 - Intermuscular (in the muscle)
 - Subcutaneously (under the skin)
 - Capable of infecting all freshwater fish

EFFECTS

- Both anglers and consumers do not accept fish because of unsightly appearance



Photo credit: Bill West, Blue Iris Fish farm

PREVENTION

- **Limit initial grub infections**
 - Infected fish cannot be treated
 - Grubs live in fish for years
 - Control at this point would serve to prevent further build-up
- **Break the cycle (snail or birds)**

SNAIL PREVENTION

Physical

- Remove vegetation
- Use of approved herbicides to control both algae and vascular plants
- Awareness of possible low oxygen related to decaying vegetation and warm water temperatures



BIRD PREVENTION

- **Migratory Bird Treaty Act**
- **Environmentally sound solutions**



BIRD PREVENTION

- **Netting, wire grids, fencing**
 - high cost, maintenance, harvest interference
- **Noise-making devices**
 - propane cannons, cracker shells
- **Visual devices**
 - “eye-spot” balloons, remote-control boats and planes, scarecrows
- **Large active dogs highly recommended**

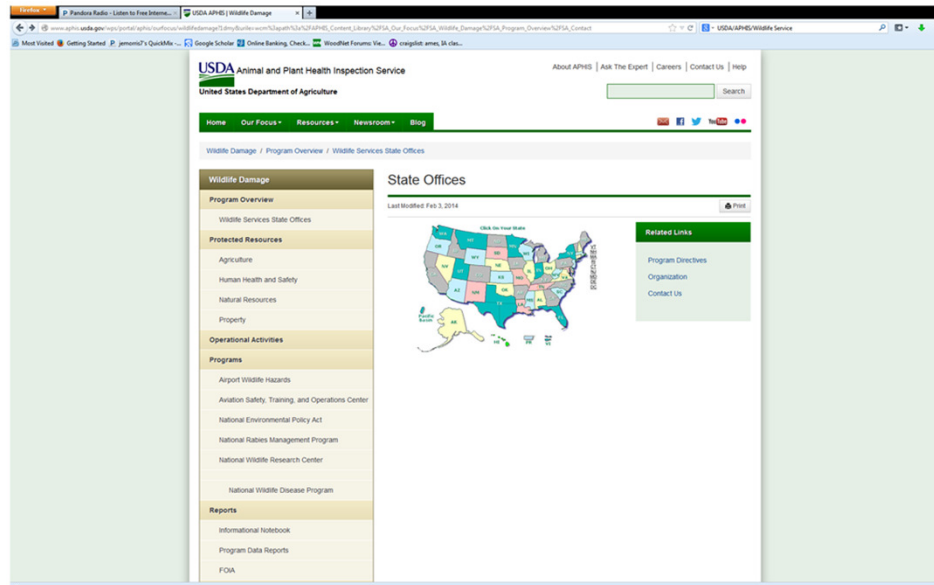


BIRD PREVENTION

U.S. Fish and Wildlife Service (US-FWS)

- Issue depredation permits after assessing damage
- Remove limited amount of fish-eating birds from specific facilities
- Permits are tightly controlled (Migratory Bird Treaty Act)

USDA/APHIS/Wildlife Service



BREAKING UP THE LIFE CYCLE

PHYSICAL



PHYSICAL MEANS

- **Aquatic plant and algae control**
 - Removes detritus material for snails to live
- **Drying pond bottoms**
 - Use of lime
 - Delays culture season
 - Only limits the onset not the actual occurrence of snails
- **Use of flow** (Blue Iris Farm)
 - Use of pond-side tanks with flow to limit infestation

BREAKING UP LIFE CYCLE

CHEMICAL



CHEMICAL

- Bayluscide™
 - Not approved for food dish
- Copper sulfate with citric acid
 - Combination of copper sulfate and citric acid along pond shore line
 - Eliminated >97% of planorbid snails
 - Uniform copper sulfate application
 - 2.5-5.0 ppm of copper sulfate effective (CC ponds)
 - Higher level may have affected fish health
 - Some species will be killed
 - Study site had >200 ppm alkalinity and hardness
 - Possible water quality problems
 - Effect on zooplankton populations
 - Low dissolved oxygen
 - Toxicity of copper to specific fish species
 - Needed awareness of the total alkalinity level

CHEMICAL

- Hydrated lime
 - Similar results as copper sulfate
 - Snails can burrow away from treatment
 - High pH effects
 - Expensive
 - Can be ~\$300/acre

CHEMICAL

- NCRAC project
 - Investigated chemical, biological and their combination period
 - Chemical (SIU-C)
 - Hydrated lime
 - Due to pond mixing, settled lime mixed with water column resulting in high pH levels
 - Ponds treated with hydrated lime at 70 lb/10 ft of shoreline in a 3.3-ft m swath
 - 99% estimated reductions in snail densities following application, but snail populations rebounded to previous levels within 2 months
 - Chemical, biological and combination effective

BREAKING UP LIFE CYCLE

BIOLOGICAL



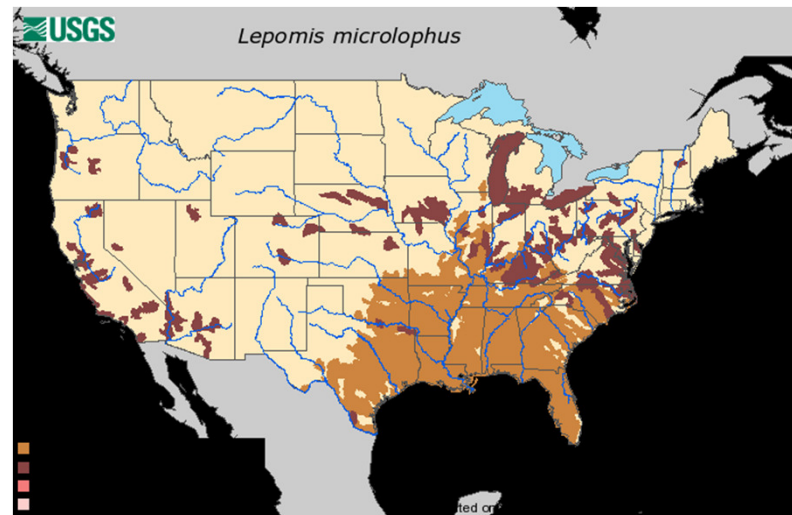
BIOLOGICAL

- **Supplemental stocking of snail predators**

- Redear sunfish (shellcracker)
 - Good snail consumption but limited by mouth gape
 - >4 inch avoid snails > 1/2 inch
 - Effective in controlling Physa but not rams-horn snails until fully mature
 - Limited by cold climates



U.S. Geological Survey



BIOLOGICAL

- Hybrid redear sunfish (redeer x green sunfish)
 - Larger mouth gape
 - NCRAC Project (Southern Illinois University-Carbondale)
 - 4.7 – 5.5 TL consumed Physa and Planorbella up to 12.0 mm (0.5 in) total length; redear sunfish in this size range only consumed snails <0.4 inch total length.
 - Maximum consumption rates equivalent to those of similar size redear sunfish.
 - Stocked 4 redear sunfish and 4 hybrid redear per acre
 - Reduced snail populations over the culture period

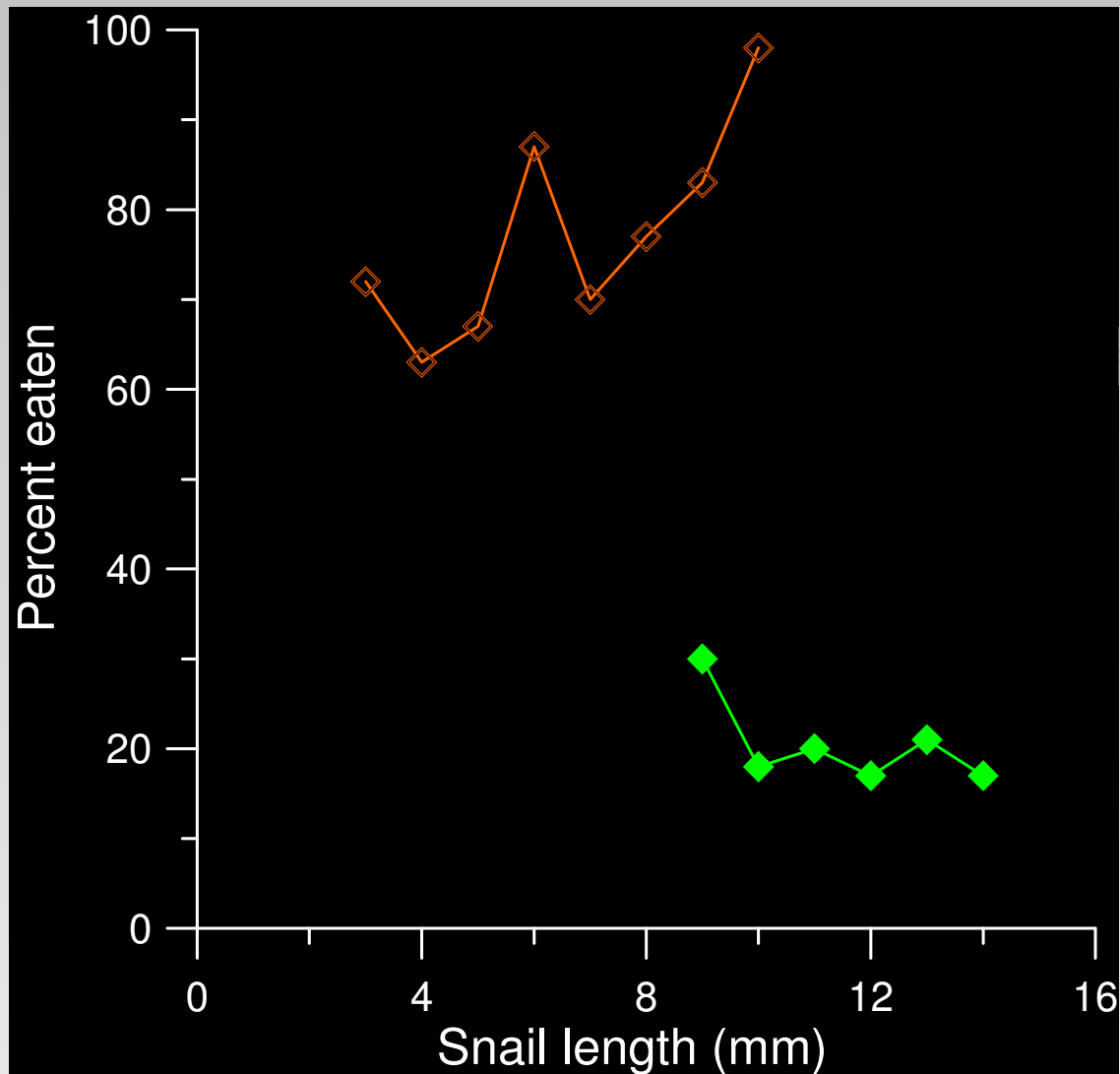
BIOLOGICAL

- NCRAC Project (UW-Stevens Point)
 - Use of crawfish resulted in 18-43% fewer grub infestations in yellow perch over 2 years
 - More time needed for complete snail elimination
 - Only 2-12% of snails actually infested yellow grub parasite

OTHER POSSIBLE PREDATORS

- **Black carp**
 - Exotic, illegal
- **Blue catfish**
- **Freshwater drum**
- **Freshwater prawns**
 - NCRAC (Southern Illinois University-Carbondale)
 - Freshwater prawns showed a strong preference for consuming *Physa* over *Planorbella*

SNAIL SPECIES AND SIZE PREFERENCES FRESHWATER PRAWN



Physa
Helisoma

Greg Whitley, Southern Illinois University-Carbondale

INFORMATION

- **NCRAC site**
 - Grub ID
 - <http://www.ncrac.org/node/633>
 - Literature review
 - http://www.ncrac.org/files/snail_control_litrev.pdf
 - Technical Bulletin #115
 - http://www.ncrac.org/files/technical_bulletins/TB115.pdf
 - Aquatic plant management
 - <http://www.ncrac.org/node/631>
 - Termination report
 - <http://www.ncrac.org/oldfiles/NR/rdonlyres/ED6821DA-6562-4C05-9F83-B0DBF8300EEC/148527/ncracapr20092010sec11of12.pdf>
 - Wisconsin study
 - <http://datcp.wi.gov/uploads/Business/pdf/2009/24023BlueIris.pdf>
 - <http://mysare.sare.org/mySARE/ProjectReport.aspx?do=viewRept&pn=FNC08-731&y=2010&t=1>

CONCLUSIONS

- Prevention when possible
- Use care in use of chemical controls
- Consider use of biological controls for long-term controls



Contact

Joe Morris

Telephone: 515-294-4622

email: jemorris@iastate.edu

Web site: <http://www.public.iastate.edu/~jemorris/>