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

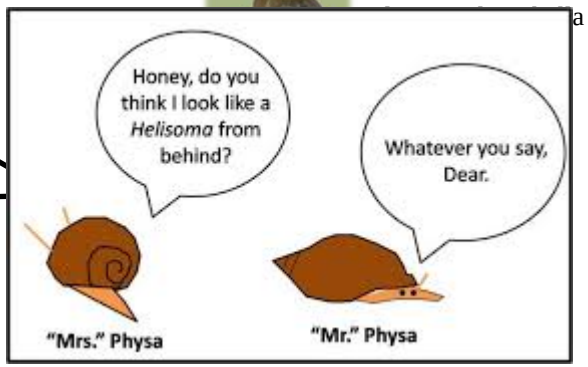
GENERIC LIFE CYCLE

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

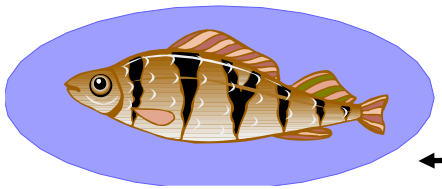
U.S. Fish and Wildlife Service

Physa

eggs



cercariae



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

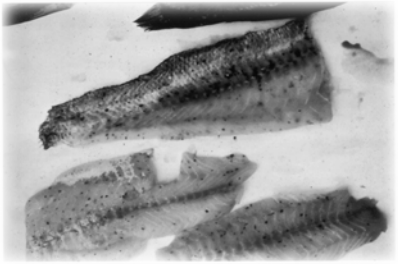


Photo credit: Parasite and Disease Section, Dept. of Fisheries and Allied Aquacultures, Auburn University

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

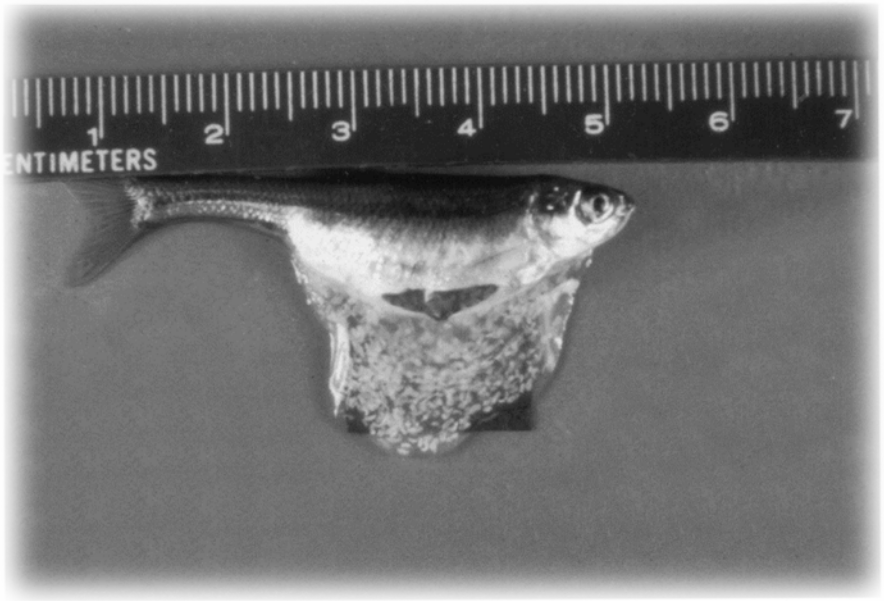


Photo credit: Andrew J. Mitchell, USDA/ARS, Stuttgart, AK

YELLOW GRUB

- **Common parasite in North America**
  - Size (3 to 8 mm or 1/8 to ¼ 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

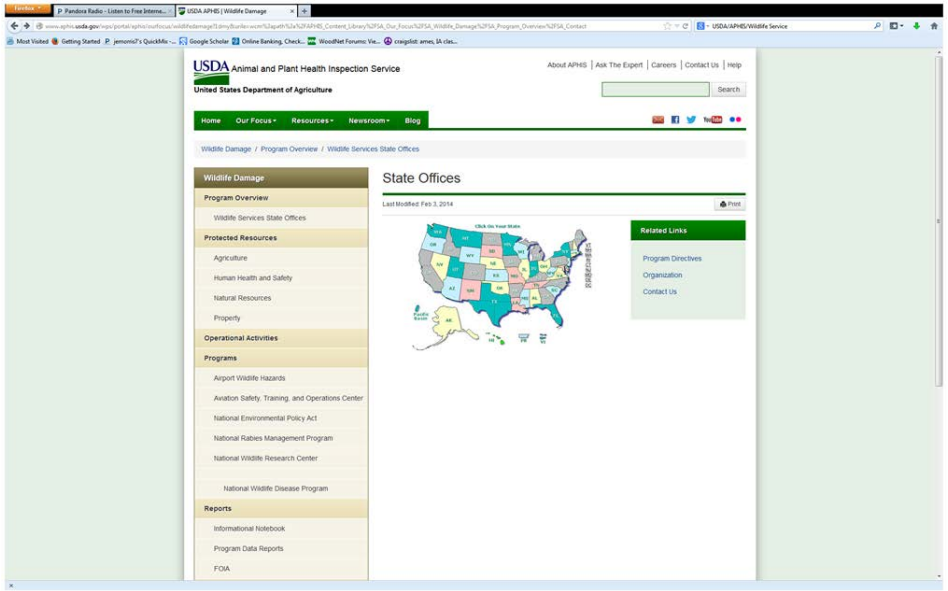
- **Netting, wire grids, fencing**
  - high cost, maintenance, harvest interference
- **Noise-making devices**
  - propane cannons, cracker shells
- **Visual devices**
  - “eye-spot” balloons, remote-control boats and planes, scarecrows
- **Large active dogs highly recommended**

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

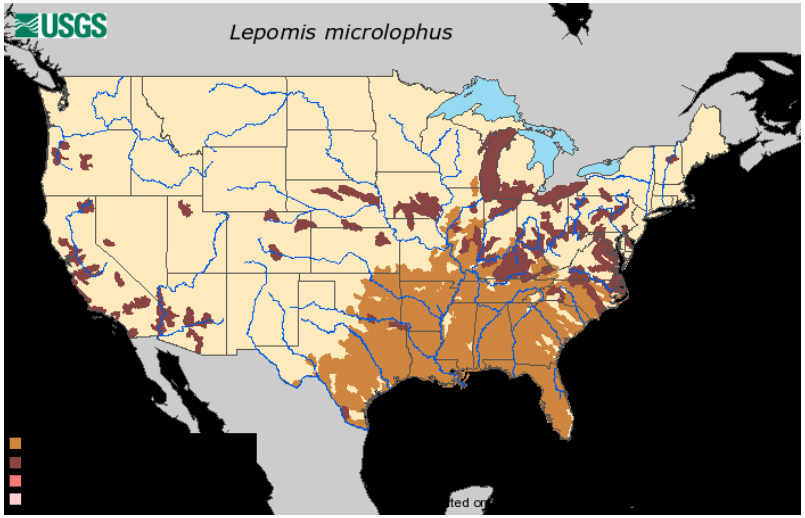
BREAKING UP LIFE CYCLE

BIOLOGICAL

BIOLOGICAL

U.S. Geological Survey

- **Supplemental stocking of snail predators**
  - Redear sunfish (shellcracker)
    - Good snail consumption but limited by mouth gape
    - >4 inch avoid snails > ½ inch
    - Effective in controlling Physa but not rams-horn snails until fully mature
    - Limited by cold climates



BIOLOGICAL

- Hybrid redear sunfish (redear 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

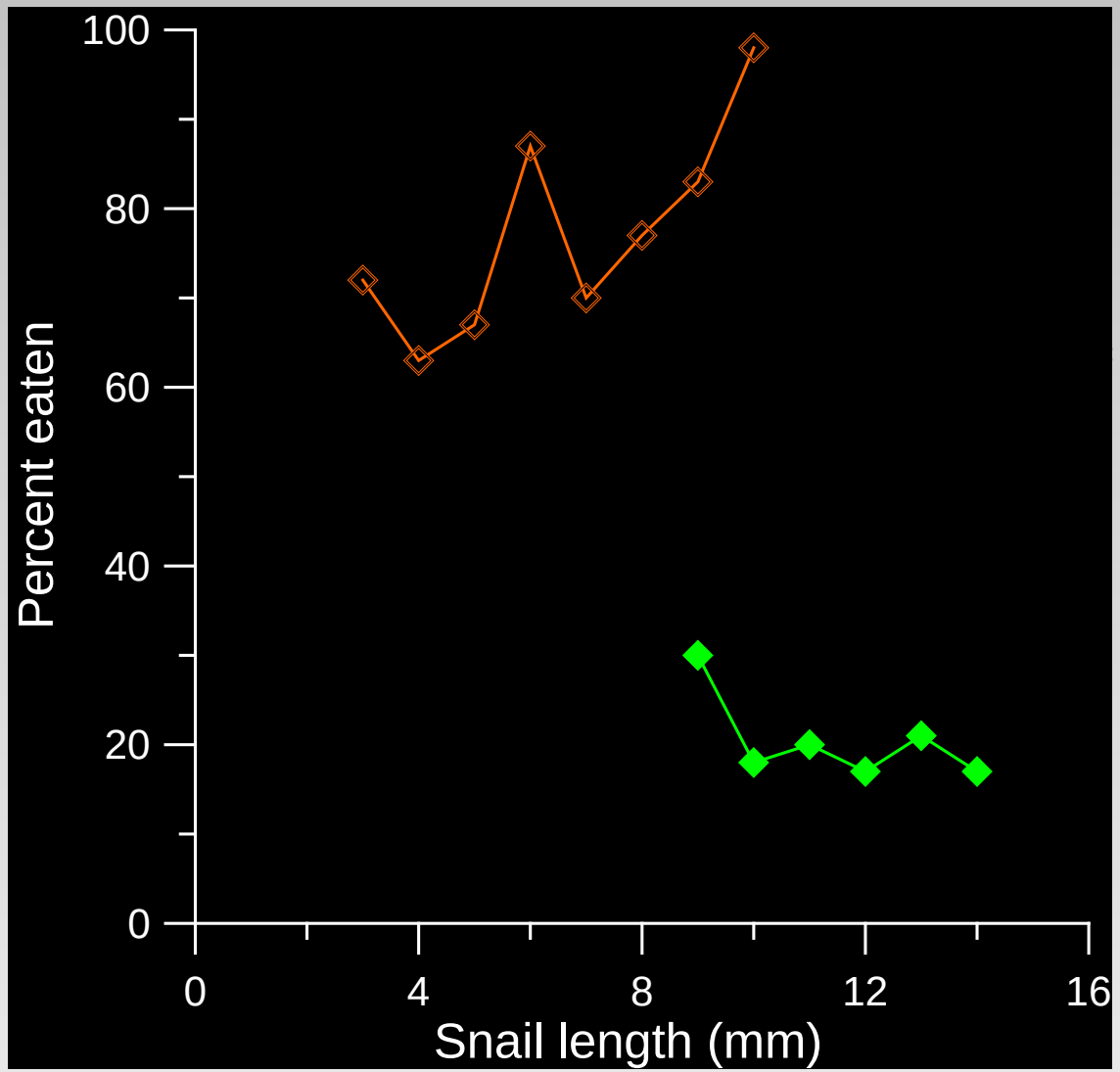
BIOLOGICAL

- 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 Whitledge, 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 Bulleting #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**

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