OCCURRENCE AND CONNECTION OF BLACK SPOT DISEASE IN PROXIMITY OF SEWAGE TREATMENT FACILITIES

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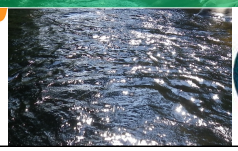


OUTLINE

- Why look at teatment facilities?
- What is Blackspot disease?
- Human impacts?
- Fish impacts?
- Interaction of facilities and disease
- How can we monitor the disease?

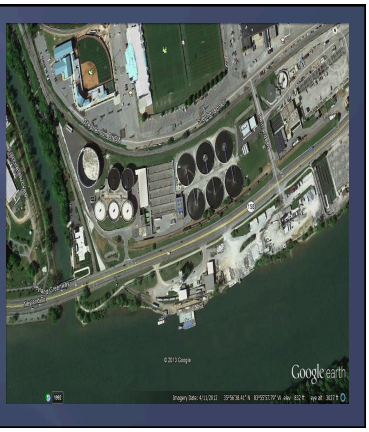
Sewage Discharge

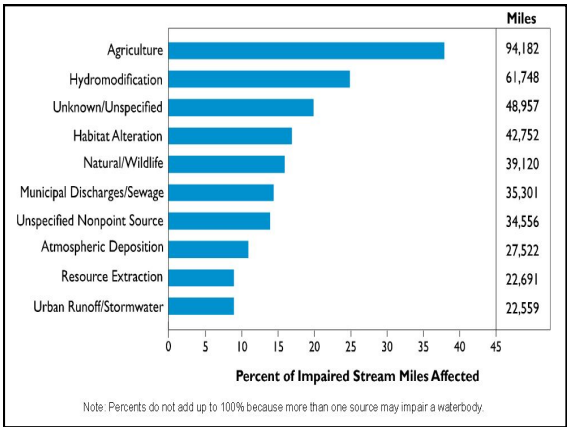
Reasons for Treatment Scrutiny

- ~ 35,301 miles of stream impacts
- Increase in disease near outflows
- Decrease of stream water quality
- Similar disease has major human impacts

Sewage Facility Locations

- Located in all urban areas
- Most are close to waterways
- Many are outdated
- Many are not functioning properly



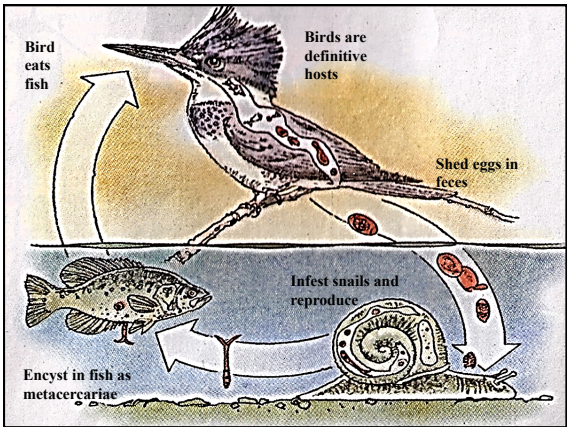


Black Spot Disease

- *Uvilifer ambloplitis* and *Crassiphiala bulboglossa* are main parasites
- Schistosome parasitic flatworm
- Very common in most fishes
- Parasitic on fish, snails, and birds
- Infects skin and tissues
- Host deposits black pigment around the worm

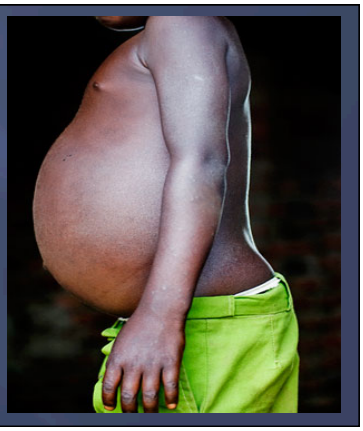
Life Cycle

- Requires water, fish eating birds, snails, fish
- Birds are definitive hosts
- Eggs released into water thru feces or thru mouth (~21 day incubation)
- Larvae (miracidia) infects snails and reproduce asexually
- Leave snails as free swimming cercariae
- Encyst in fish as metacercariae
- Fish eaten by birds



Human Health Impacts

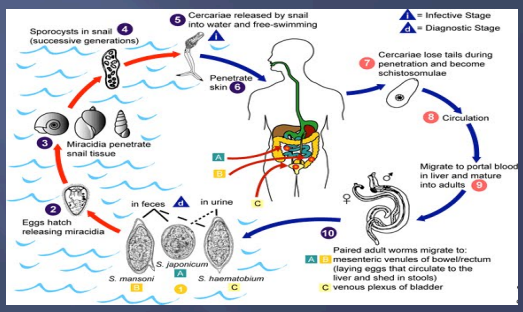
- None from *Uvilifer ambloplitis*
- *Schistomoniasis* is caused by the Genus Schistosoma
- Kills 50 million people annually



Human Health Impacts

- Second most socioeconomically devastating disease
- Snails are intermediary hosts
- Found where there is improper water sanitation

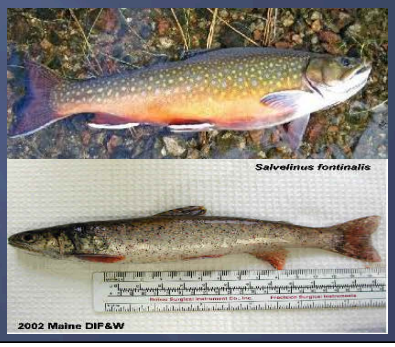
Schistomoniasis Life Cycle



Fisheries Impacts

- Greater predation
- Higher metabolic rate
- Fewer fish overwinter
- Blindness
- Unappetizing flesh in food fish

Healthy vs. Diseased



Highly Infected Stoneroller

Blindness

Parasitized Fillet

What Increases Blackspot?

- Organic nutrient increase (sewage)
- Increased snail habitat
- Higher populations of fish eating birds

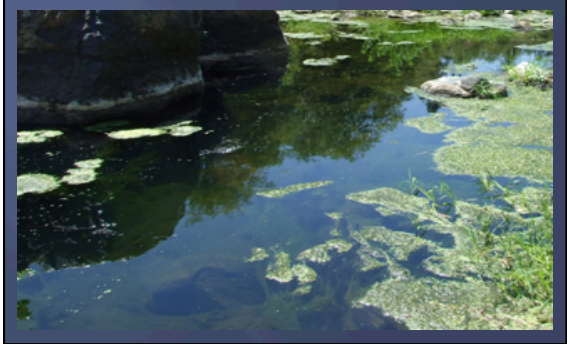
Improperly Treated Sewage

- Increases Nutrient loads
- Increases bacteria loads
- Decreases dissolved oxygen

Nutrient Increase Effects

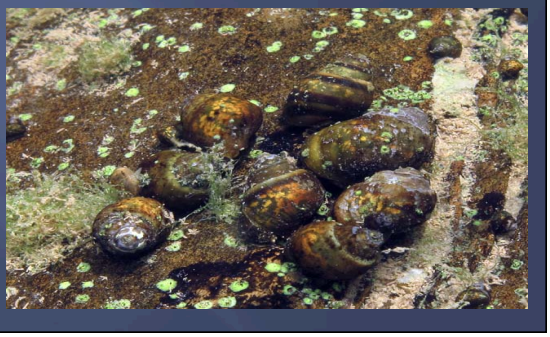
- Increased periphyton
- Increased algae blooms
- Increased aquatic herbivore populations

Periphyton Increase



Increased Algae Blooms

Increase in Snails



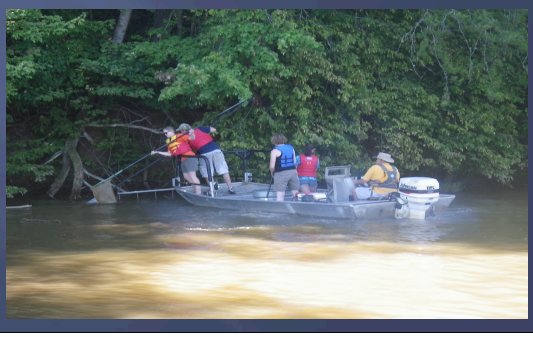
Increase in Piscivorous Birds

Sampling Methods

- Backpack shocking
- Boat shocking
- Seining
- Periphyton abundance for nutrient monitoring

Backpack Shocking

Boat shocking



Seining

Periphyton Abundance

Future Directions

- Indexes Biotic Integrity should emphasize disease anomalies
- Include categories for snails and other mollusk
- Monitor for increase in Nitrogen and Phosphorous
- Sewage inflows and transport pipes should be checked more regularly

Photo Credits

- UT Fisheries
- Maine Department of Fisheries
- CDC
- www.Googleearth.com
- www.epa.gov

Literature Cited

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