

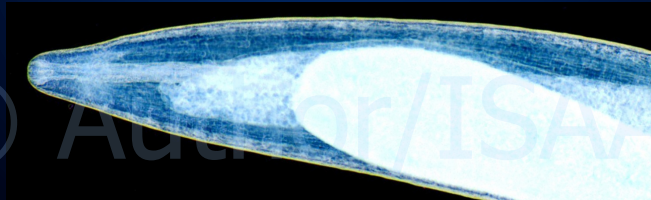
Health and reproductive consequences for
Sciaenops ocellatus (Perciformes:Sciaenidae)
infected with the ovarian parasite *Philometra*
floridensis (Nematoda:Philometridae)



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Overview

- The parasitic nematode *Philometra floridensis* infects the ovary of the economically important red drum and prevalence is high
- Life history is unknown
- Factors influencing host susceptibility are unknown
- Pathogenic effects and reproductive consequences of infection are unknown.



Introduction: The Host



Introduction: The Host



Introduction: The Host

- One of the most important sport fish in Florida:
1,217,152 kg or 3,788,645 fish landed in 2008 (NMFS)
- Concerns about declining population due to overfishing
have led to restricted seasons, bag and size limits, and
a complete ban on commercial fishing since 1988



Introduction: The Host

- Aquaculture species - for stock enhancement and as
food fish (USA, Martinique, Ecuador, Israel, and China
are listed by FAO-UN as main producer countries)



Introduction: The Host

- Juveniles occur in estuarine habitats – tidal rivers/bays



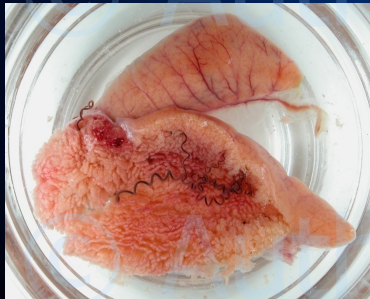
Introduction: The Host

- Adults are generally neritic and spawning takes place primarily in passes and lower estuarine areas

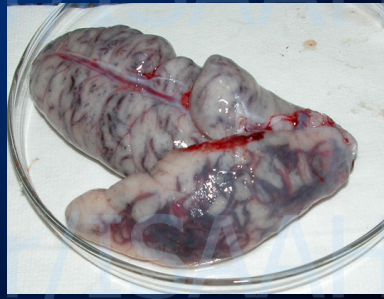


Introduction: The Parasite

- Dracunculoidea: Philometridae
- Species of *Philometra* infect gonads of economically and ecologically important fishes around the globe
- Gonad infecting species are associated with varying degrees of pathogenicity

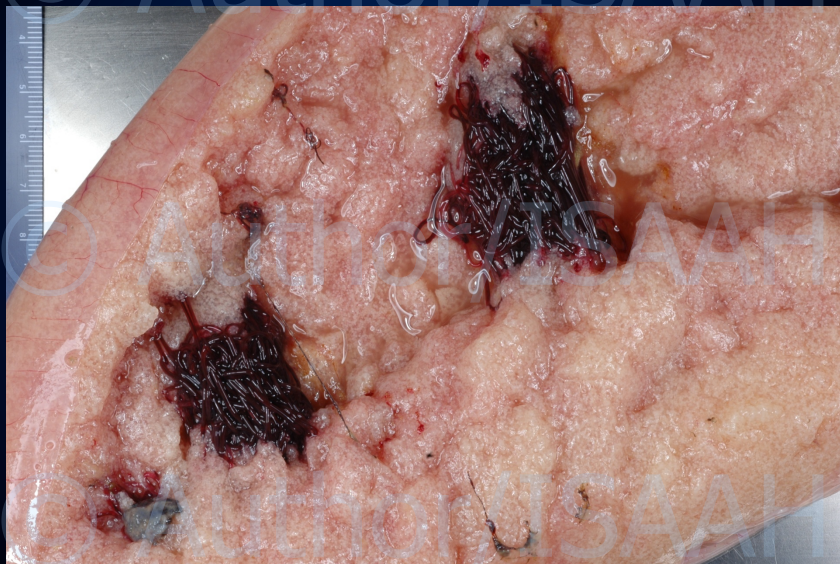


Philometra sp. infecting gray snapper



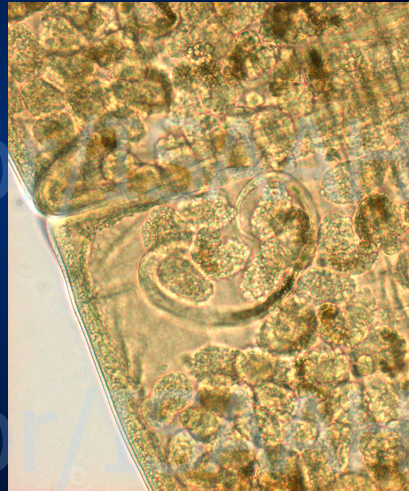
P. margolisi infecting red grouper

Introduction: The Parasite

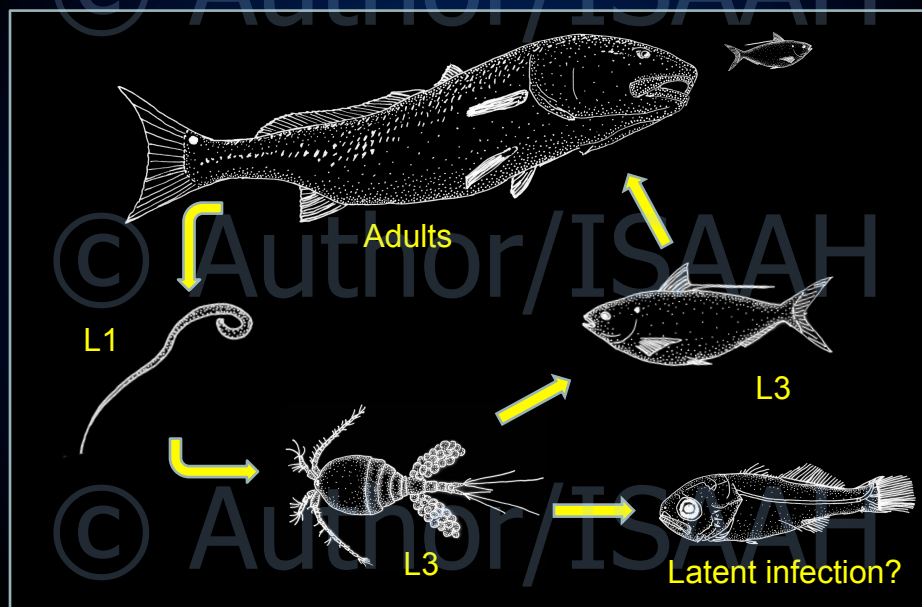


Introduction: The Parasite

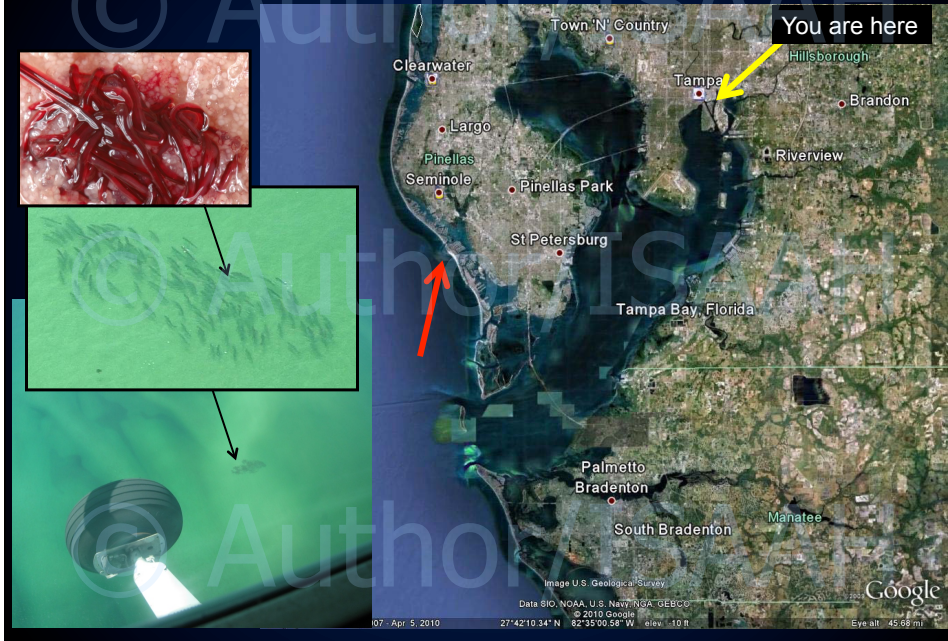
- Ovoviparous development of stage 1 larvae (L1)



Introduction: Parasite Life Cycle



Methods: Collecting red drum



Methods: Collecting red drum

- Contracted commercial purse seiner



Methods: Processing red drum

- Standard length
- Total weight
- Gonad weight
- Otoliths
- Ovary tissue for batch fecundity estimates and histological staging



Methods: Health indices and fecundity

- Gonadosomatic Index (GSI) = $\frac{100 \times GW}{TW}$
- Fulton's condition factor (K) = $\left(\frac{TW - GW}{TL^3} \right)^{n^4}$

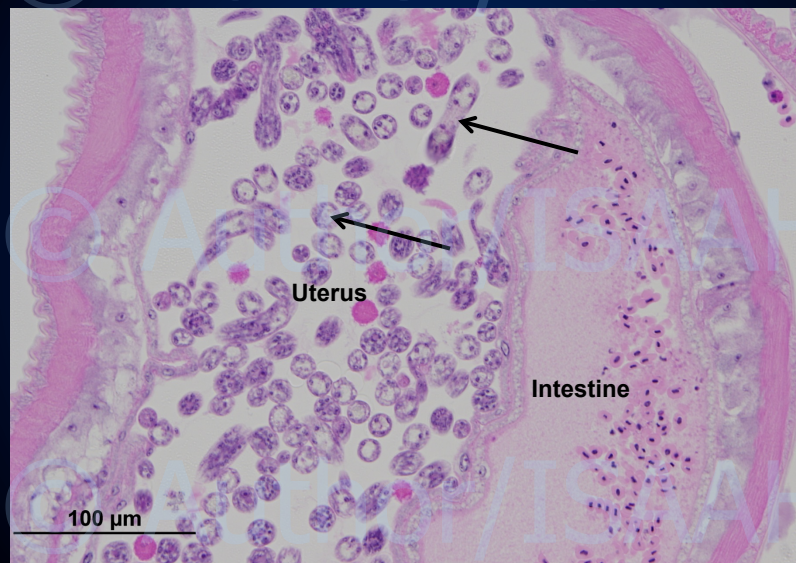


Methods: Batch fecundity

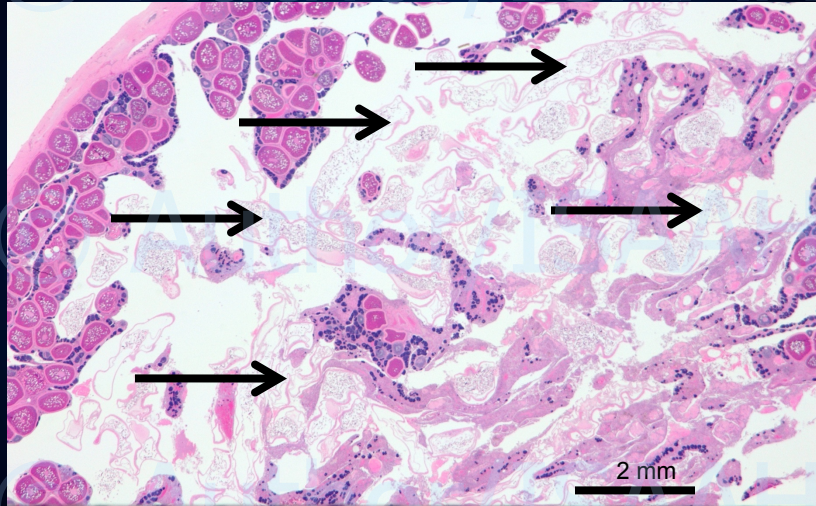
- Gravimetric hydrated oocyte method (Hunter et al. 1985).



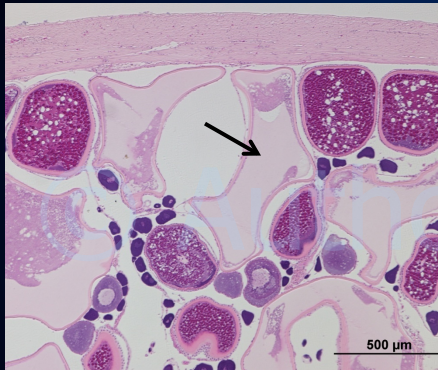
Results: Histological section of a gravid nematode



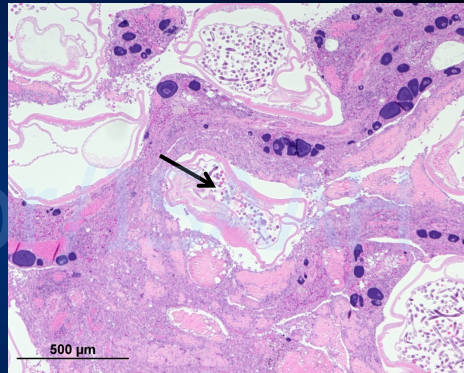
Results: Histological appearance of parasitized ovary



Results: Section of normal vs infected ovary

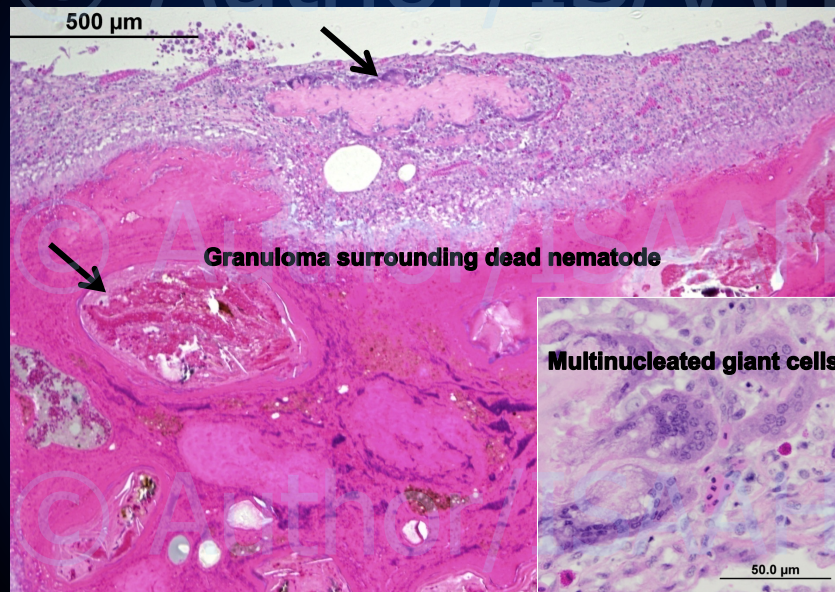


Section showing uninfected area



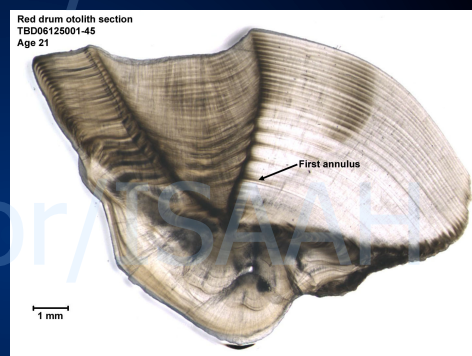
Parasitized area of ovary

Results: Section of encapsulated dead worm

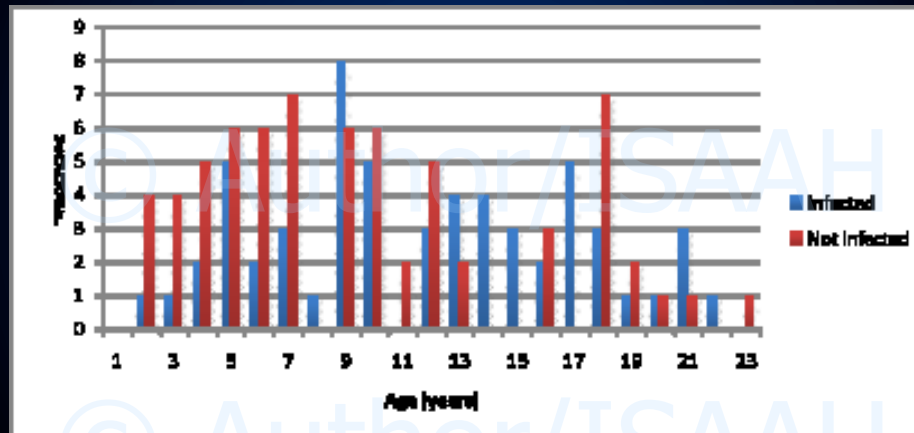


Results: Demographics of prevalence

- 290 red drum (164 males and 126 females)
- Fish age ranged from 3 to 29 years (mean 12 years)
- 91% of ovaries showed oocyte maturation – these fish would have spawned that night
- No male fish was infected
- Prevalence was 46% for female fish overall
- Prevalence was higher in larger, older, and actively spawning females

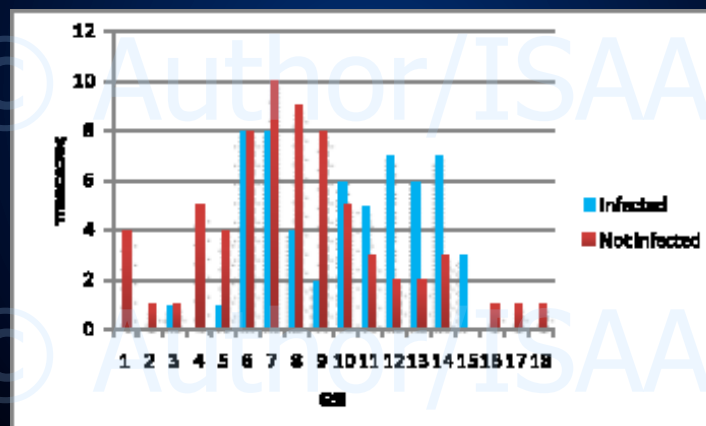


Results: Demographics of prevalence



Results: Health indices

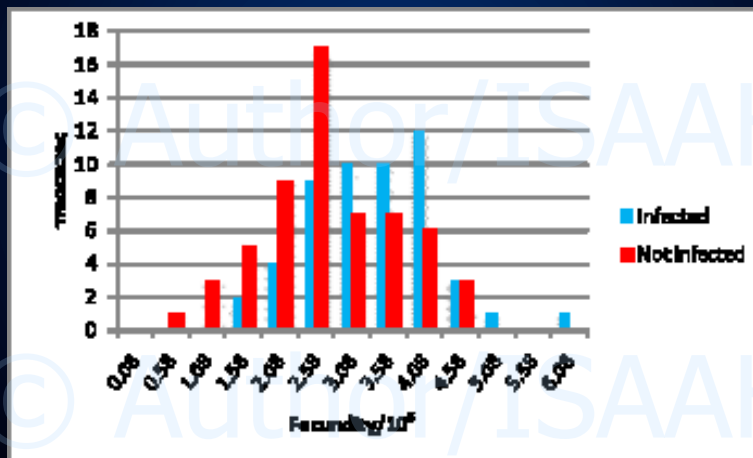
- Mean K : Infected (0.97) > uninfected (0.95)
(T-test, n = 126, P = 0.1055)
- Mean GSI : Infected (mean 10.6) > uninfected (mean 8.2)



Results: Batch fecundity

- Mean BF was greater in parasitized than non parasitized fish.

(T-test, $n = 110$, $p < 0.001$)



Conclusions

- Male red drum either aren't infected or, more likely, *P. floridensis* cannot mature in testes
- *P. floridensis* likely has an annual life cycle in synch with its host's spawning season
- Greater prevalence in larger, older, actively spawning hosts is probably a reflection of the parasite's annual life cycle and may partially explain unexpected relationships between parasitism and batch fecundity



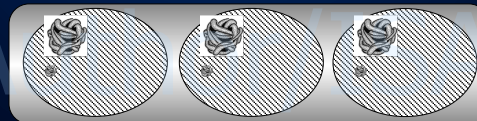
Conclusions (cont.)

- While negative health effects are apparent histologically, we were not able to measure any negative effect at the organismal level
 - Sampling error due to localization of pathological effects
 - Maybe infected hosts are able to shift resources to areas of the ovary that are distant from worms

Light infection



Heavy infection



Acknowledgements

- The FWRI Fisheries Independent Monitoring group processed fish for life history data and samples, and provided gonad samples for parasitology

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