

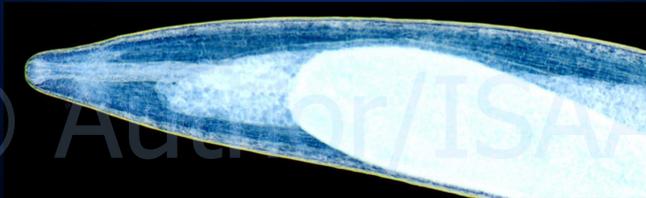
Health and reproductive consequences for *Sciaenops ocellatus* (Perciformes:Sciaenidae) infected with the ovarian parasite *Philometra floridensis* (Nematoda:Philometridae)



Micah D. Bakenhaster*, Susan Lowerre-Barbieri, Yasunari Kiryu, Sarah Walters, and Emma J. Fajer-Avila

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.



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Introduction: The Host



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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



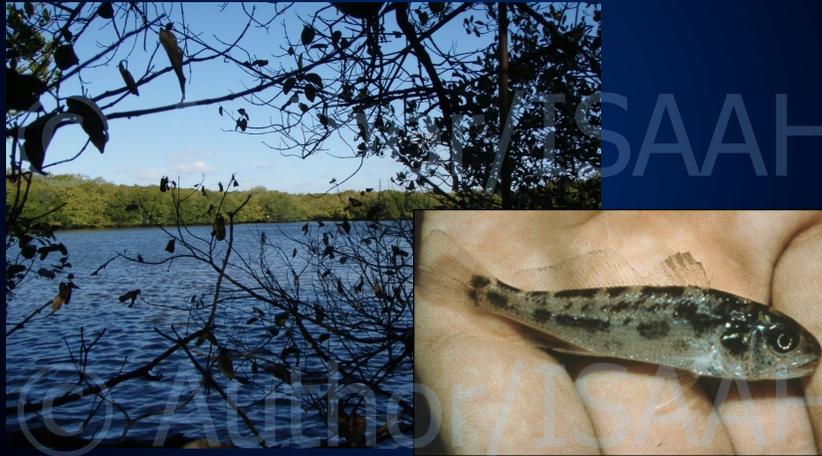
Introduction: The Host

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



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Introduction: The Host

- Juveniles occur in estuarine habitats – tidal rivers/bays



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Introduction: The Host

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

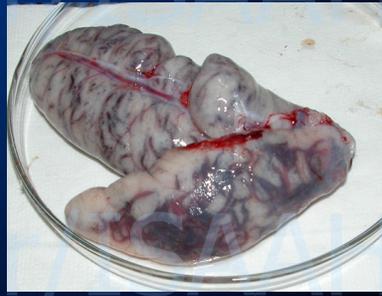


Introduction: The Parasite

- 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



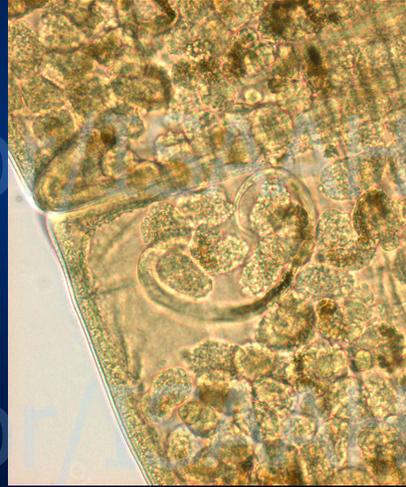
P. margolisi infecting red grouper

Introduction: The Parasite

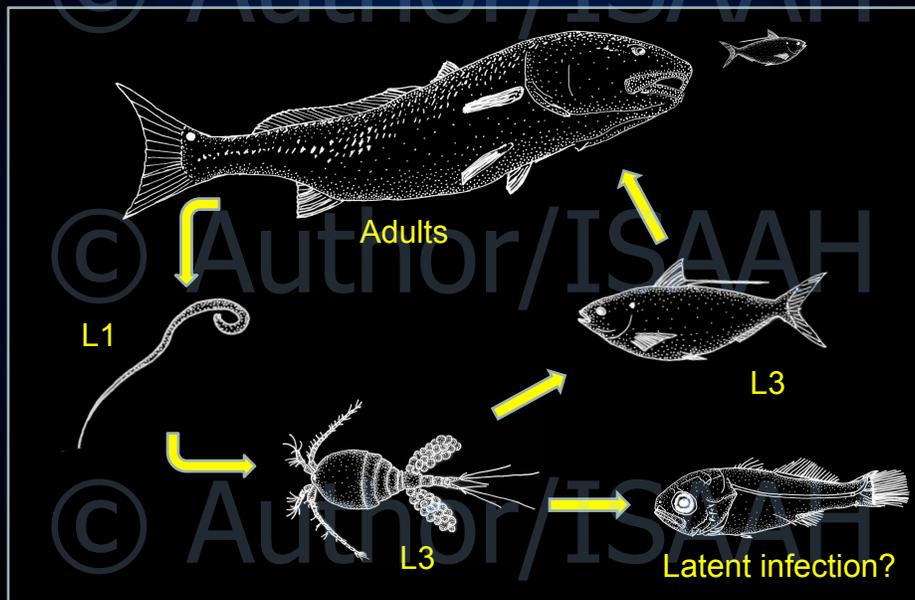


Introduction: The Parasite

- 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) = $\left(\frac{TW - GW}{TL^3} \right)^{n^4}$

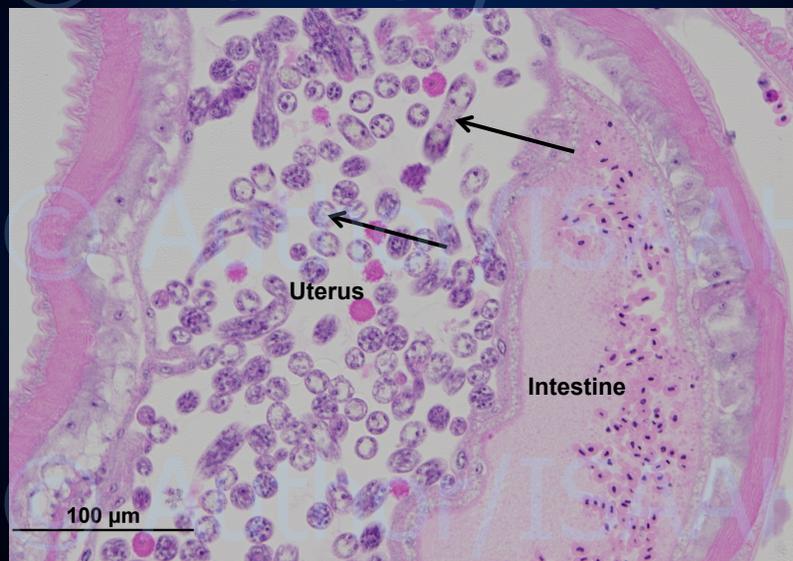


Methods: Batch fecundity

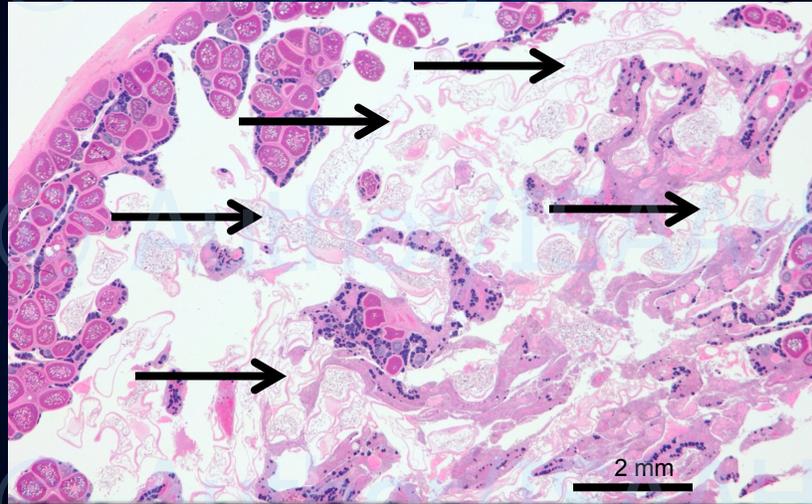
- Gravimetric hydrated oocyte method (Hunter et al. 1985).



Results: Histological section of a gravid nematode



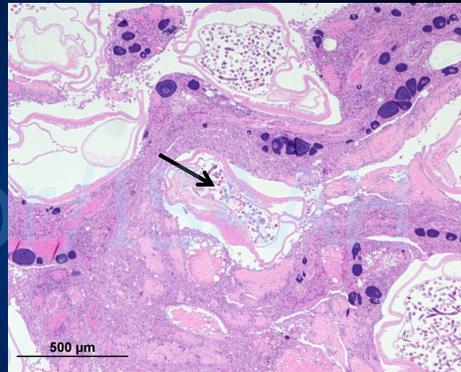
Results: Histological appearance of parasitized ovary



Results: Section of normal vs infected ovary

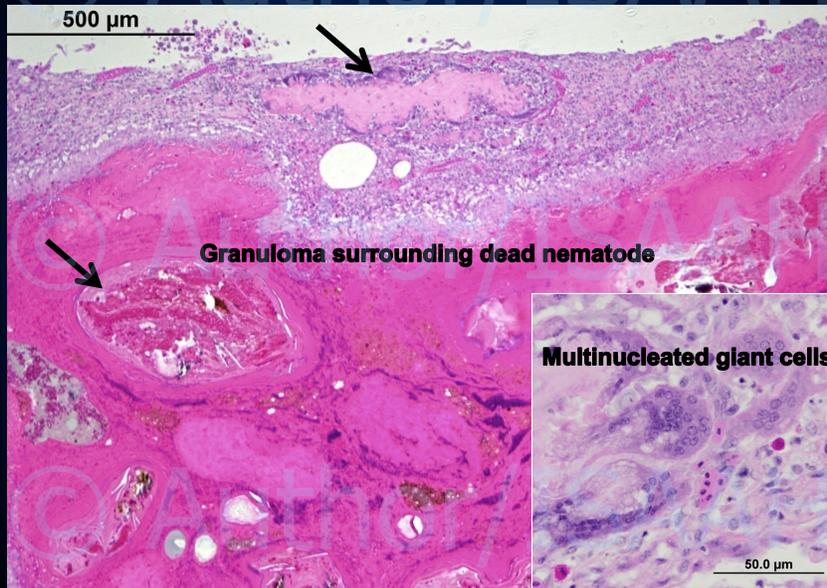


Section showing uninfected area



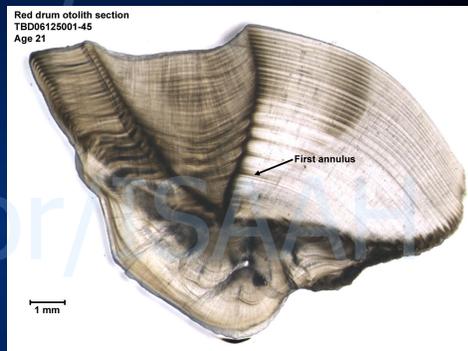
Parasitized area of ovary

Results: Section of encapsulated dead worm

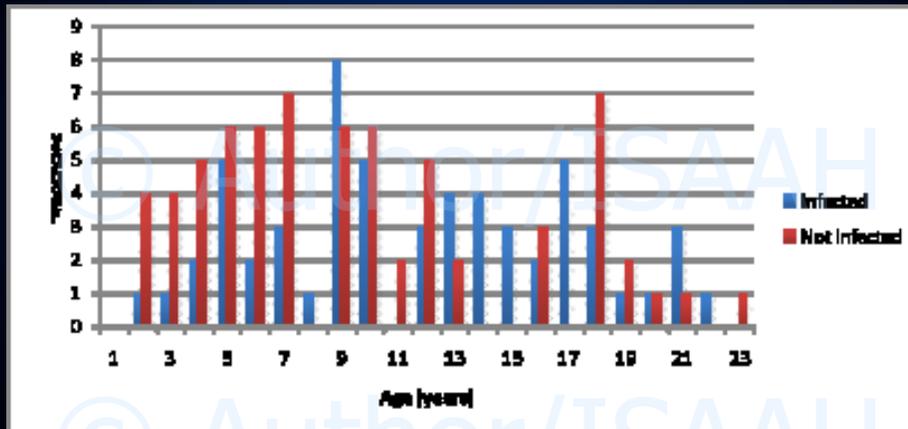


Results: Demographics of prevalence

- 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

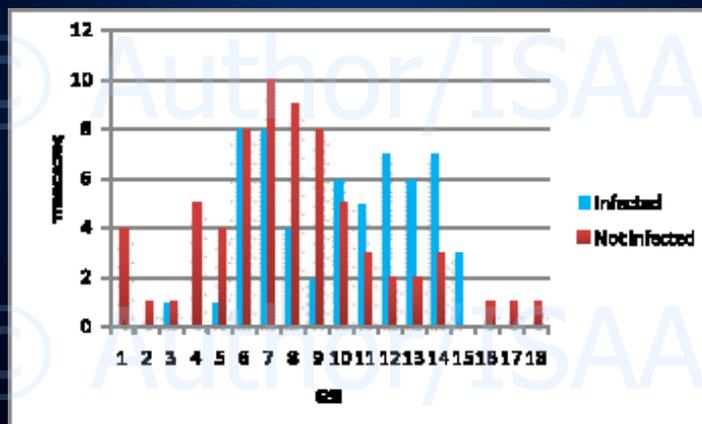


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Results: Demographics of prevalence



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Results: Health indices

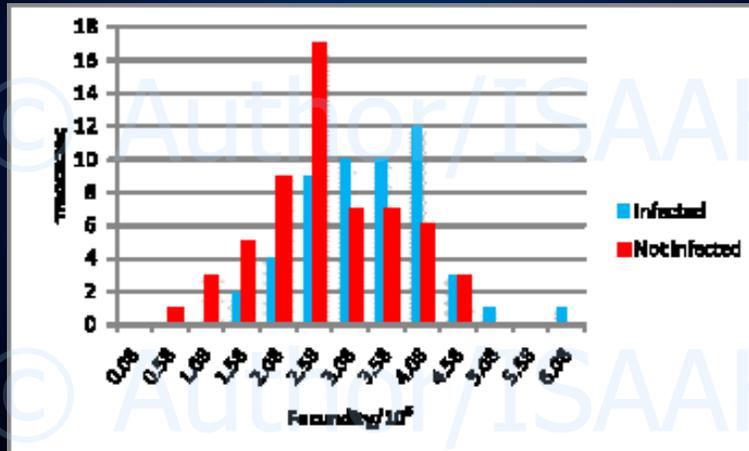
- Mean K : Infected (0.97) > uninfected (0.95)
 (T-test, n = 126, P = 0.1055)
- Mean GSI : Infected (mean 10.6) > uninfected (mean 8.2)



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



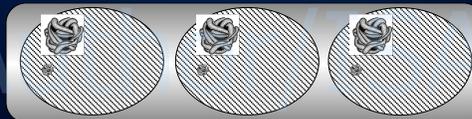
Conclusions (cont.)

- 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

Bradham, Buddy; Bruger, Tom; Brumer, Elise; Caillouet, Ryan; Cammardella, Daniel; Courtney, Frank; Davis, John; Do, Vincent; Dunham, Nicole; Emory, Travis; Fischer, Keith; Fisk, Sean; Flaherty, Kerry; Fletcher, Will; Guenther, Cameron; Hall, Brittany; Heagey, Bob; Jones, Ryan; Kanaszka, Theresa; Keenan, Sean; Knight, Julianne; Leffler, Debbie; Lenhart, Brad; MacDonald, Tim; Matheson, Eddie; Matson, Andrew; McLaughlin, Grant; McMichael, Bob; McWhorter, Kyle; Onorato, Greg; Parks, Sheri; Pittinger, Brett; Ramos, Gabriel; Riese, Amy; Rolls, Holly; Singer, Michael; Stafford, Chris; Stahl, Scott; Switzer, Ted; Tortorelli, Jenna; Tyler-Jedlund, Mandy; Vecchio, Julie; Warner, Steven; Weather, Eric; Winner, Brent

- FWRI Fisheries Biology group processed gonad and otolith tissue and shared data

Bickford, Joel; Singer, Michael; Tunnell, Janet; Carroll, Jessica; Amick, Allison; Crabtree, Laura

- FWRI Fish and Wildlife Health group assisted with necropsy and histological processing or provided other support

Richardson, Adam; Tabuchi, Maki; Cody, Theresa; Hilber, Susan; Noretta, Perry; Piacenza, Teresa; Brown, Catalina; Brown, Howie



Acknowledgements (cont.)

- Funding
 - NOAA grant NA05NMF4331078
 - Florida saltwater recreational fishing license revenues
 - USFWS Sport Fish Restoration Grant programs F-43 and F-72
 - Mexico Sabbatical Grant 2007-81 886

