
METAZOAN PARASITE COMMUNITY STRUCTURE IN BLUEGILL (*LEPOMIS MACROCHIRUS*) AS AN INDICATOR OF THE IMPACT OF URBANIZATION ON TWO STREAMS IN SAN ANTONIO, TEXAS

Methods

- Strategy: Expose caged fish to ambient parasites
- Use bluegill (*Lepomis macrochirus*) from local aquaculturist (Tank Hollow Fisheries) as host
- Timetable: Late summer 1999 and 2000
- Part of larger project
- Slightly different methodology between years

Cage Schematic

60 cm X 90 cm X 30 cm, partitioned into 6, 900-cm ^{3} compartments

90-cm PVC pipes with capped ends to float them at the water surface

Plastic-coated wire mesh panels-- retain the fish but allowed natural feeding and prevented algae from building up

Fiberglass screening on inside floor to prevent supplemented food from falling through the cage

- Cages anchored into stream bed with fence post
- 2 cages, 12 fish per site

Methods (cont'd)

- Fish weighed when put into system and at end of experiment
- Bluegill in system for ~20 days to establish parasite communities and expose fish to stream conditions
- Fed supplemental food
- Water-chemistry samples taken from each site

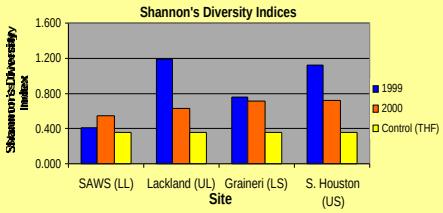
Parasitology

- Fish euthanized with overdose of MS-222
- Whole fish stored in 10% buffered formalin for transport to lab
- External surfaces examined for ectoparasites
- Gill arches excised, mucous and gill filaments scraped
- Internal organs (e.g. heart, liver, intestine, and stomach) teased apart and examined
- All metazoan parasites counted and identified to lowest taxonomic group

Parasitology (cont'd)

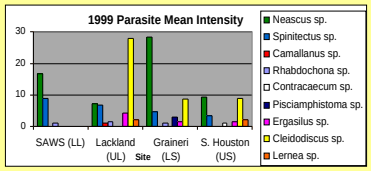
- Trematodes and monogeneans stained with Semichon's carmine; dehydrated with 70%, 80%, 95%, and 100% ethanol; cleared using xylene; and, mounted in Kleermount®
- Nematodes cleared using a 50:50, ethanol:glycerine solution and stored in glycerine
- Copepods were stored in 70% ethanol

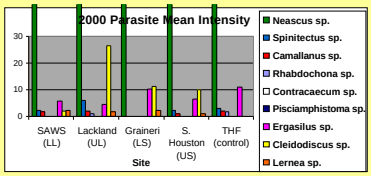
Results: Parasites



* Control diversity from 1 sample, not 4 samples

Results: Parasites



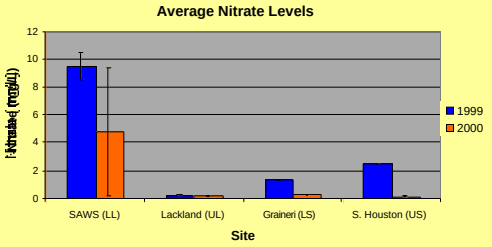


Kruskal-Wallis

Parasite	P value (sig <0.05)
Lernea spp.	0.0829
Cleidodiscus spp.	0.0003
Ergasilus spp.	0.0069
Spinitectus spp.	0.9388
Camallanus spp.	0.3916

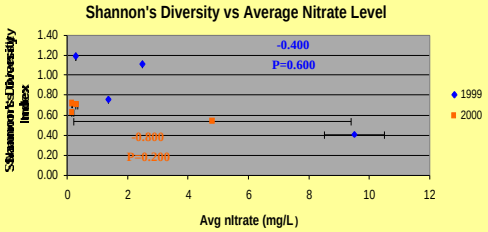
Parasite	P value (sig <0.05)
Lernea spp.	0.0131
Cleidodiscus spp.	0.0005
Ergasilus spp.	0.0130
Spinitectus spp.	0.2983
Camallanus spp.	0.4880

Results: Nitrates



Adapted from Murawski, unpublished data

Results



Results

Parasite species vs. average nitrate level

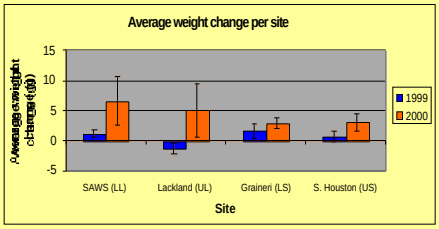
Spearman's correlation $P < 0.05$

Parasite	1999	2000
Cleidodiscus spp.	--	--
Lernea spp.	--	+
Ergasilus spp.	--	NC
Neascus spp.	+	--

Summary of Results

- Downstream sites had lower diversity and higher nitrate levels than upstream sites
- Lower Leon site had the highest dissolved nitrate level and lowest diversity
- In 1999 only endoparasites found at lower Leon site; in 2000 only ectoparasites found at lower Salado site
- Mean intensity of ***Cleidodiscus*** spp. and ***Ergasilus*** spp. significantly different among sites in both years
- ***Cleidodiscus*** spp., ***Lernea*** spp., ***Ergasilus*** spp., and ***Neascus*** spp. correlated with nitrate levels

Results: Fish Weight Change



Kruskal-Wallis P-value

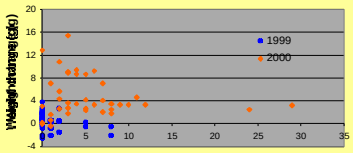
1999 <0.0001

2000 0.0074

- Both average nitrate level and Shannon's Diversity Index were uncorrelated with average weight change of fish, using Spearman's correlation

Results: Fish Weight Change

Individual Bluegill Weight Change vs *Ergasilus* spp.



Spearman's Correlation

ρ=

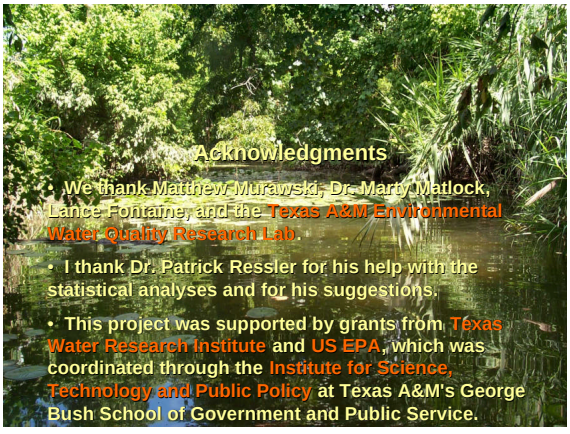
ρ=

Summary of Results

- Fish weight change significantly different among sites
- Fish at downstream sites gained more weight than at upstream sites
- Load of ***Ergasilus*** spp. correlated significantly with fish weight change--but negatively in 1999 and positively in 2000

Conclusions

- Patterns among sites were different in 1999 and 2000, but there were consistent trends between years
- Data from downstream sites suggest impacts of urbanization: higher nitrate levels, lower parasite metazoan community diversity, greater bluegill weight change, and differences in metazoan community structure
- Because they were associated with nitrate and weight change, monoxenous ectoparasites like ***Cleidodiscus*** spp. and ***Ergasilus*** spp. could possibly be used as an indicator of stream and fish health
- Wild caught fish were sampled from each site in 2000 and trace metals were assayed. Results will be addressed at the ASP meeting



Acknowledgments

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