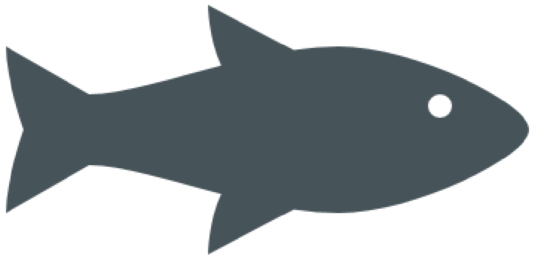

A COMPARISON OF MICROPLASTIC INGESTION BETWEEN FRESHWATER SUNFISH AND MARINE PINFISH

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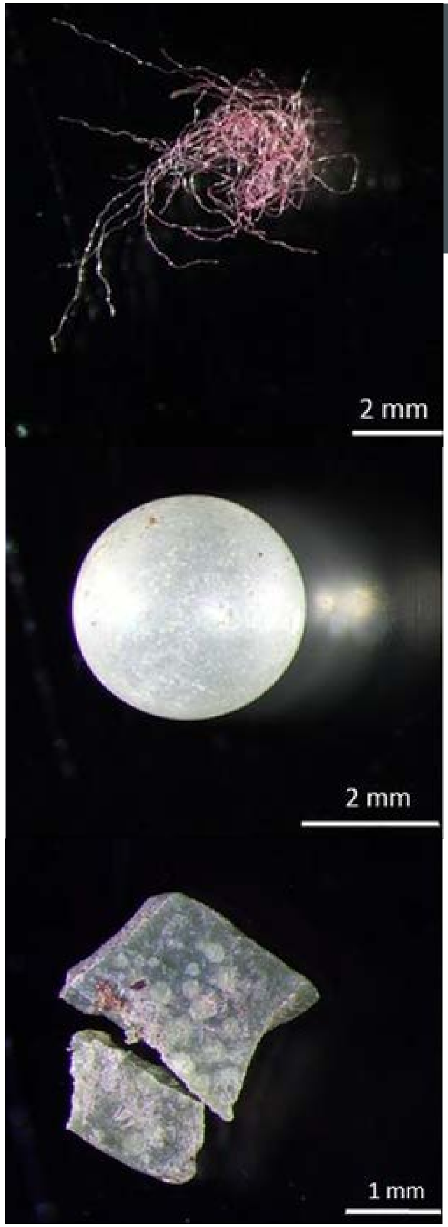
BACKGROUND



Fiber

Sphere/microbead

Fragment

Weithmann et al., 2018

- Microplastic: Plastic less than 5mm in diameter → No standard lower bound
  - **Primary source**: plastic which is released directly into the environment at a micro-scale (e.g. cosmetics, fabrics, boat cleaning materials, vectors for drugs)
  - **Secondary source**: micro sized plastic resulting from the mechanical, photolytic, or chemical degradation of macroplastics
  - **This research defines microplastics as plastics, artificial polymers (e.g. polyester or Nylon), and manufactured products (i.e. manufactured natural and non-natural material), that range in size from 53 to 5000 µm**

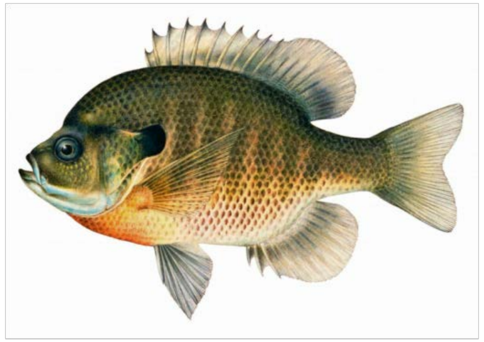
SUNFISH VS PINFISH COMPARISON

Research Goal: 1. To compare microplastic ingestion between sunfish and pinfish, which serve as ecological analogs for the freshwater and marine systems

2. Investigate shifts in microplastic frequency and type between the freshwater and marine systems examined

Sunfish and pinfish occupy a similar ecological guild (i.e. exploit similar resources) and ecological niche (i.e. role within the system), utilize suction feeding to capture prey, opportunistically forage, and are similar in body size and shape.

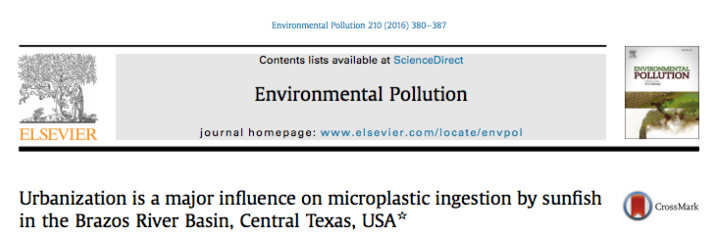
Common Name	Sunfish	Pinfish
Mean Length (cm) ± SD	12.6±2.8	14.4 ± 1.9
Length Range (cm)	7.0-20.7	9.4-20.3
Mean Weight (g) ± SD	47.2±31.7	57.3±20.1
Weight Range (g)	7.3-174.5	15.2-140.8
Stomach Weight (g)	.80±.8	1.2±1.1
Stomach Weight Range	0.1-8.81	0.2-6.0



RESULTS

Result	Pinfish	Sunfish
Total #	449	436
% ingestion	45.0%	46.5%
# mp/individual	0.80	0.96
# mp/fish (ingested mp)	1.80	2.07
Max # mp/fish	17	11

URBANIZATION IS A MAJOR INFLUENCE ON MICROPLASTIC INGESTION BY SUNFISH IN THE BRAZOS RIVER BASIN, CENTRAL TEXAS, USA


Environmental Pollution 210 (2016) 380–387

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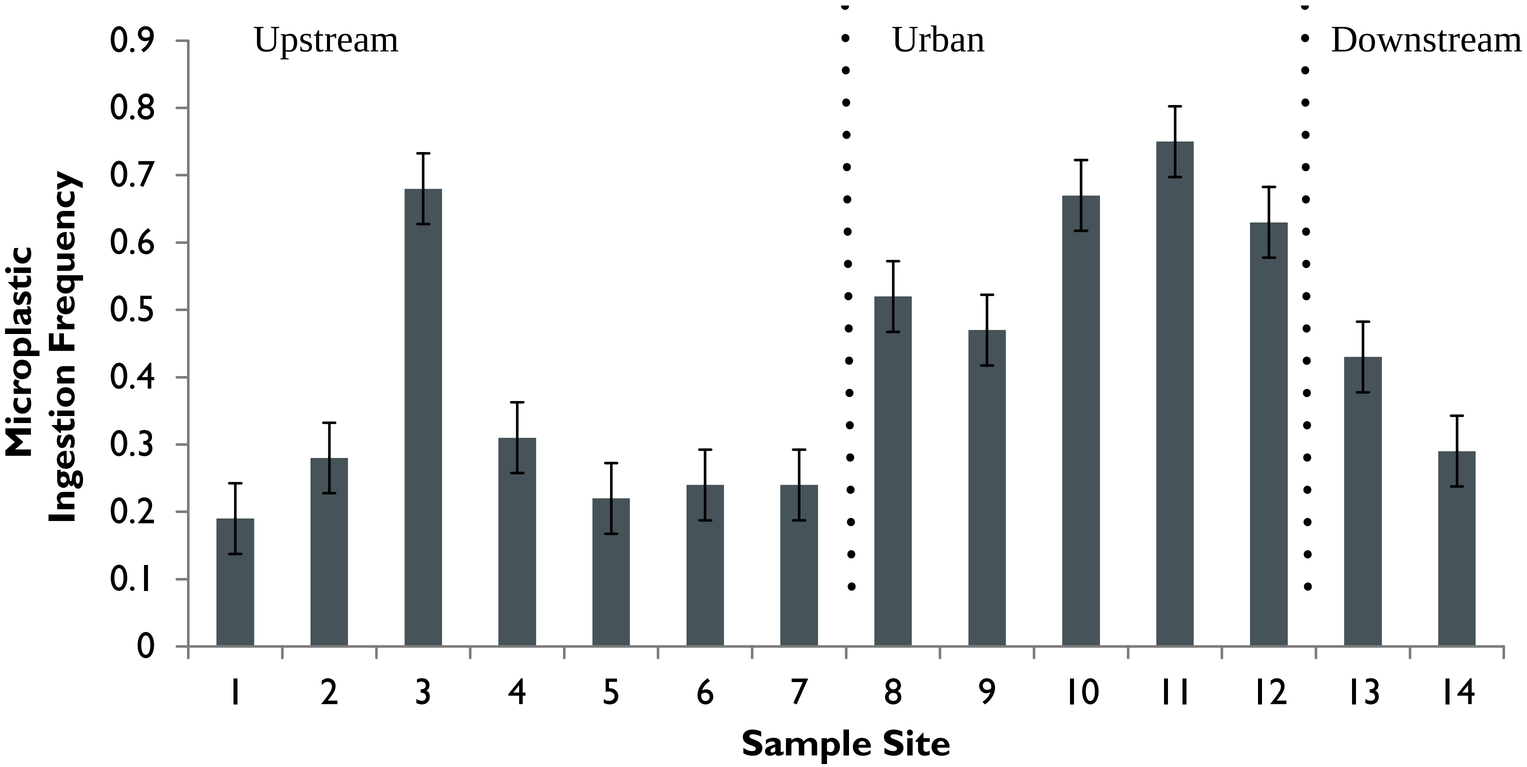
ELSEVIER

Urbanization is a major influence on microplastic ingestion by sunfish in the Brazos River Basin, Central Texas, USA☆

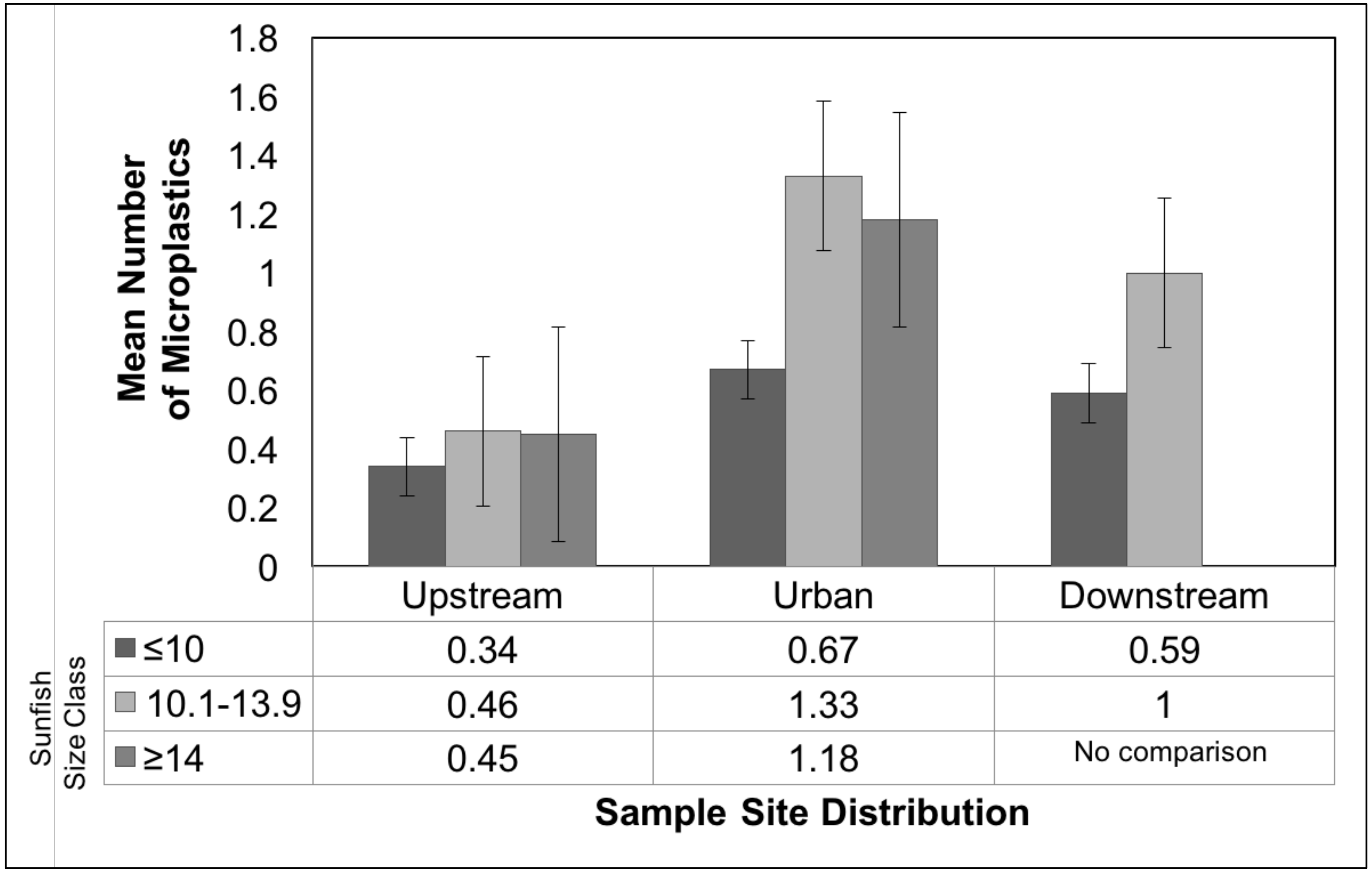
CrossMark

- Frequency of microplastic ingestion (f_{mp}) differed significantly among sample sites ($p=0.000$)
  - f_{mp} Range: 19%-75%
  - Mean number of particles per fish: 0.19-1.63



Frequency of ingested microplastic at each sample site.

CORRECTING FOR SIZE IS IMPORTANT TO STATISTICAL ANALYSIS FREE RUNNING WATERS HAVE FEWER LARGE SUNFISH



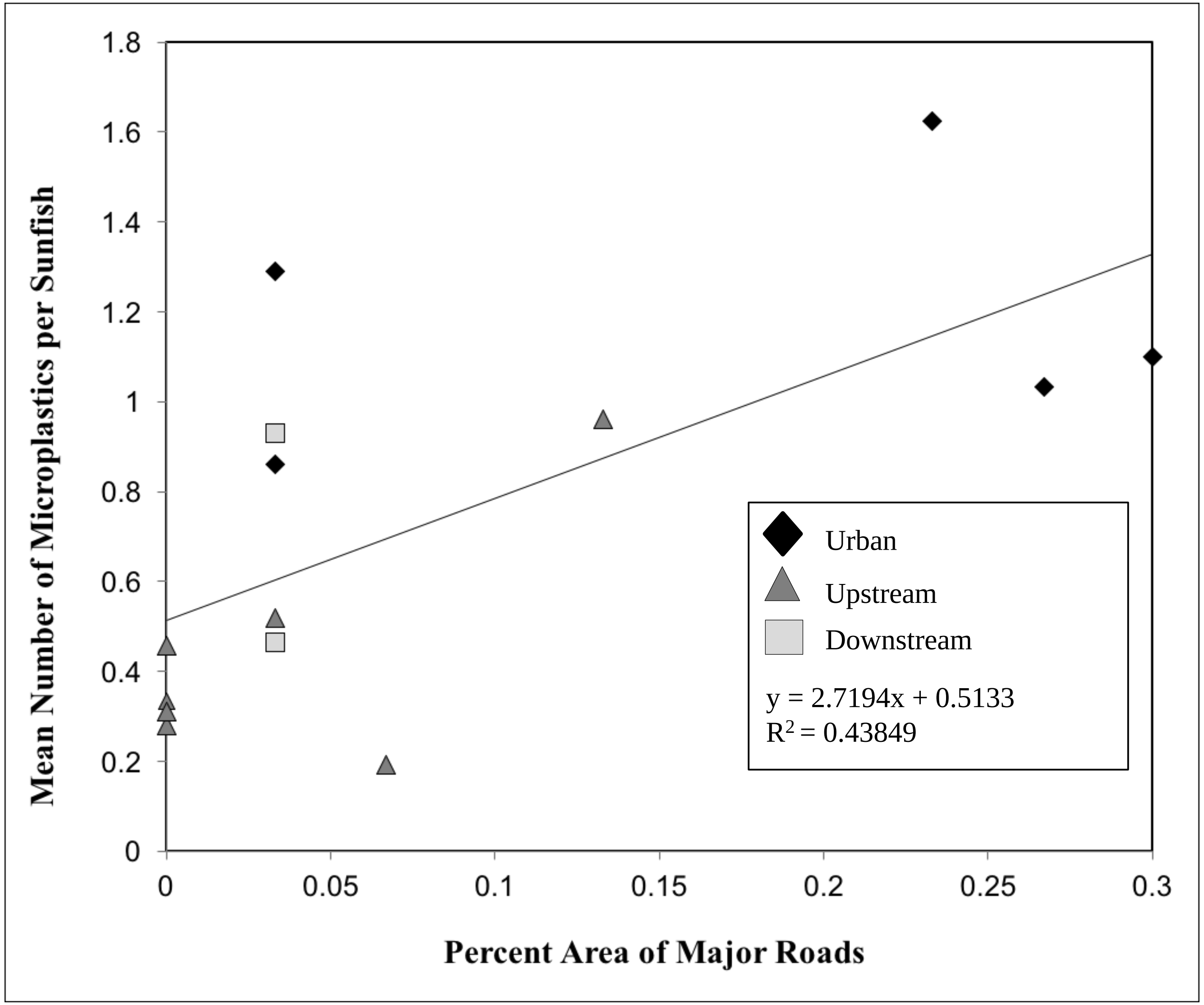


Figure 5. Linear regression of mean microplastics per sunfish versus the percent area of major roads located along 1000 m transects adjacent to each sampling site. The regression line includes all data points in the graph and closely fits with the urban data points.


Marine Pollution Bulletin 124 (2017) 82–88

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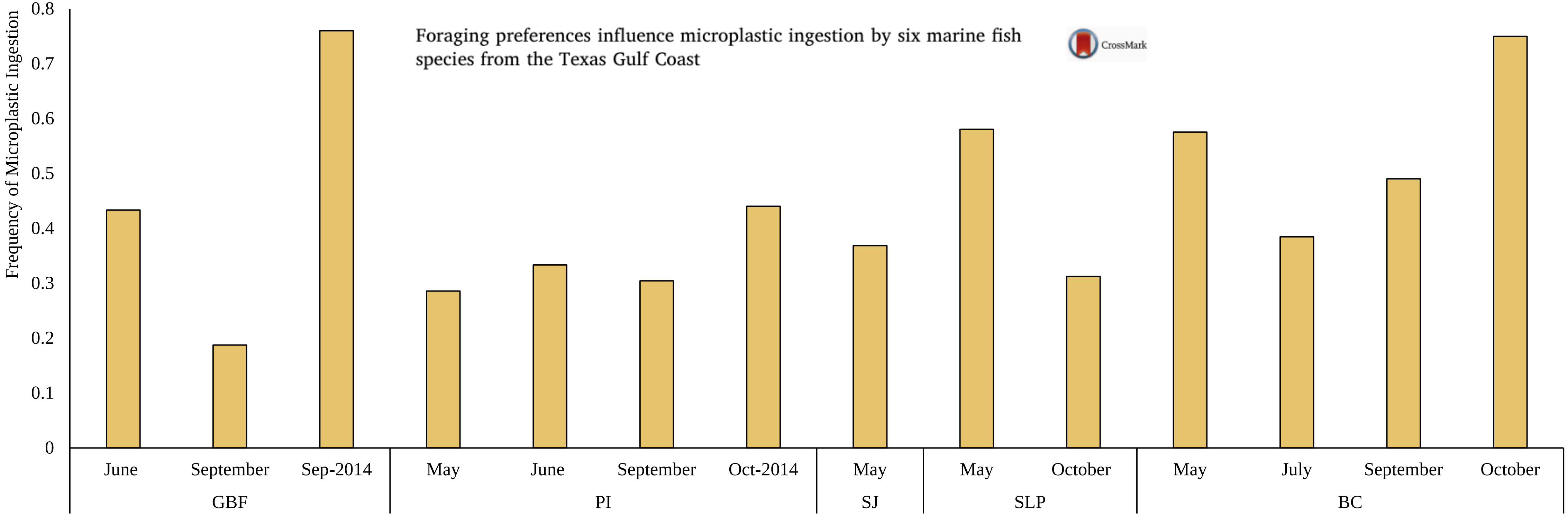
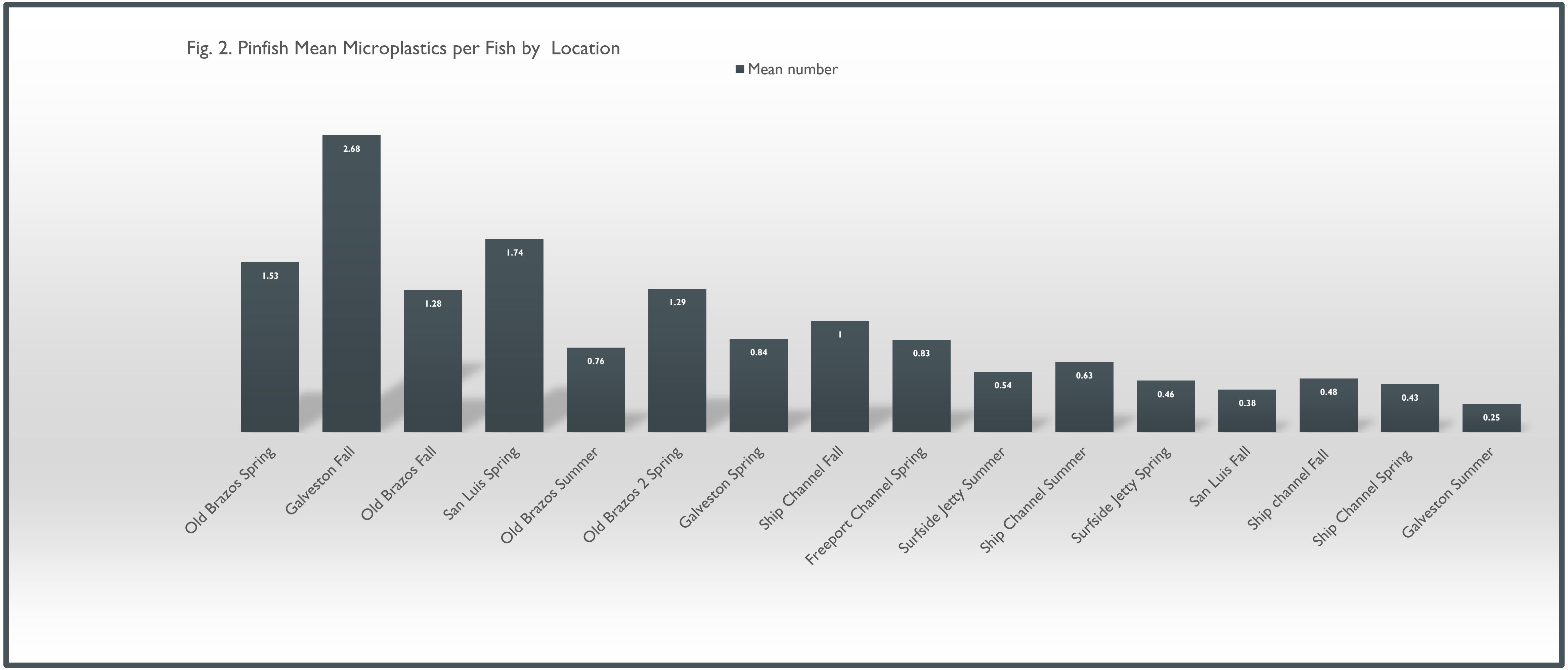
Foraging preferences influence microplastic ingestion by six marine fish species from the Texas Gulf Coast



When separated via the month and location of collection, pinfish frequency of microplastic ingestion was closer to that of sunfish, ranging from 18.8%-76.0%, (p=0.000)

EVIDENCE OF EVENT DRIVEN DIFFERENCES AT THE SAME LOCALES

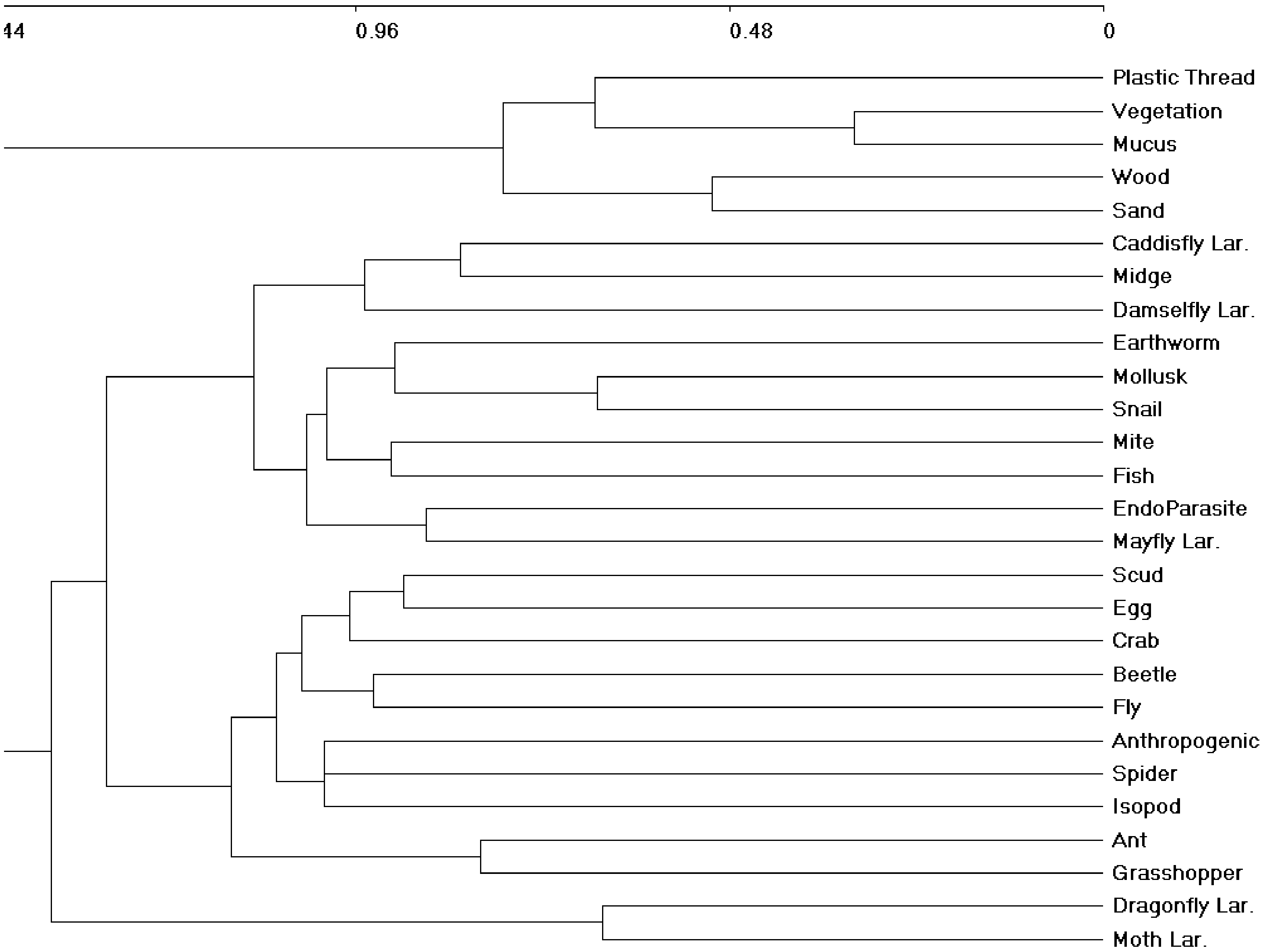


ANTHROPOGENIC ITEMS

Total anthropogenic items: 764

- Sunfish
  - 349 items total
    - 4% macro 96% micro (fibers)
  - 26 total prey groups
    - Ingested microplastic was correlated with eggs ($p=0.020$) vegetation ($p=0.025$), earthworms ($p=0.000$) and mollusks ($p=0.030$)

- Pinfish
  - 415 items total
    - 100% micro size scale
    - Fiber (97.1%), beads (2.0%), and fragments (0.90%)
    - 11 total prey groups
      - Ingested microplastic was correlated with wood ($p=0.028$) and fish (0.008)

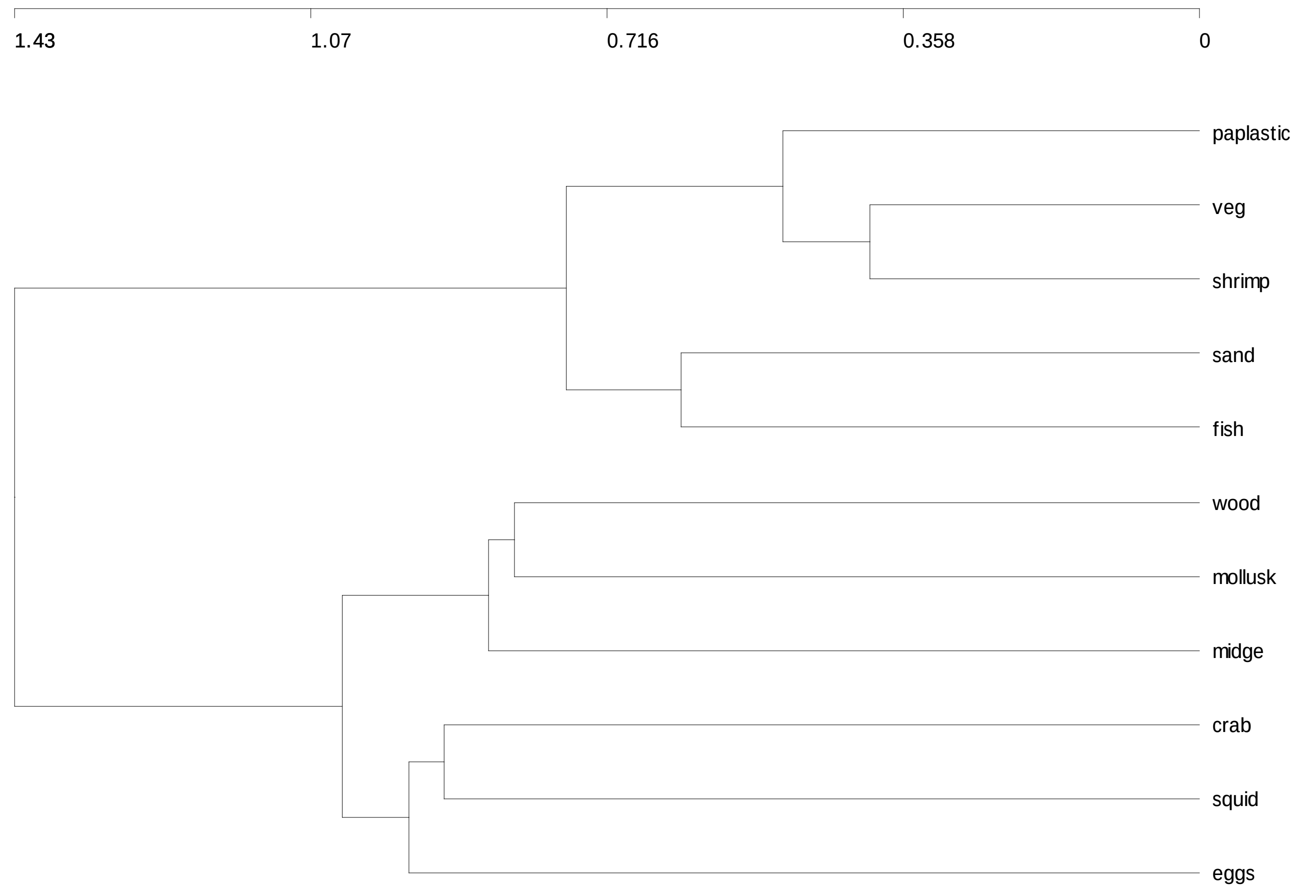


SUNFISH AGGLOMERATIVE CLUSTERING

- 26 total prey groups
  - Ingested microplastic was most closely associated with vegetation, wood, and sand

PINFISH AGGLOMERATIVE CLUSTERING

- 11 total prey groups
  - Ingested microplastic was most closely associated with vegetation and shrimp



SUNFISH VS PINFISH CONCLUSIONS

- Despite variations per species and habitat:
  - No significant difference in:
    - Overall frequency of mp ingestion
    - Mean number of particles per fish
    - Range of mp ingestion per sample site and collection
      - Weather events (e.g. events resulting in heavy wrack), may increase microplastic availability
    - Primary particle morphology (i.e. fiber)
      - Inclusion of fragments and beads within pinfish suggests a greater diversity of microplastic morphologies within marine waters, likely resulting from local industrialization, tourism, and system transport
    - Sunfish stomach content contained approximately twice the number of prey items than pinfish
      - Despite this, microplastic ingestion displayed limited associations, suggesting incidental ingestion

QUESTIONS

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