An Assessment of Microplastics in the Resacas of the Lower Rio Grande Valley

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Goals

- There have been no studies done on the Resacas of the Lower Rio Grande Valley involving microplastics
- Since there is no data, I hope that this study will provide us with novel information on the microplastic problem in the Resacas of the Lower Rio Grande Valley
- I hope to find out how the microplastics are arranged in the environment and if there is any significance or correlation in where they are found whether that be in the fish, water, or sediment
- I hope to find out if certain fish have more microplastics found in their GI tract compared to others
- I plan to find out the composition of the microplastics we obtain using infrared spectroscopy
- Hopefully I will be able to get an idea of how plastics are spread throughout this system as well as their composition
- I hope this study will provide baseline data for more studies to be done on this topic and that this will raise some sort of awareness to the problem of plastic pollution in our area

Resacas

- Resacas are defined as former channels of the Rio Grande River
- They functioned as distributaries of the Rio Grande, carrying freshwater into the Laguna Madre and Gulf of Mexico
- Many resacas used to function as seasonal water bodies that would dry up in the dry season
- These bodies of water are very important to the wildlife in the valley since they are some of the only sources of freshwater in a saltwater dominated area
- As a result of anthropogenic tampering, many resacas stay inundated year round as we pump water into the former distributaries to hold municipal drinking water

Resacas Continued

These bodies of water now primarily serve as municipal water storage, stormwater runoff canals, irrigation water storage, and resting habitat for migratory birds

There is very limited literature written or research conducted in and around resacas

Because of their setting near urban areas and their restricted flow, it is possible that they are becoming a sink for pollution

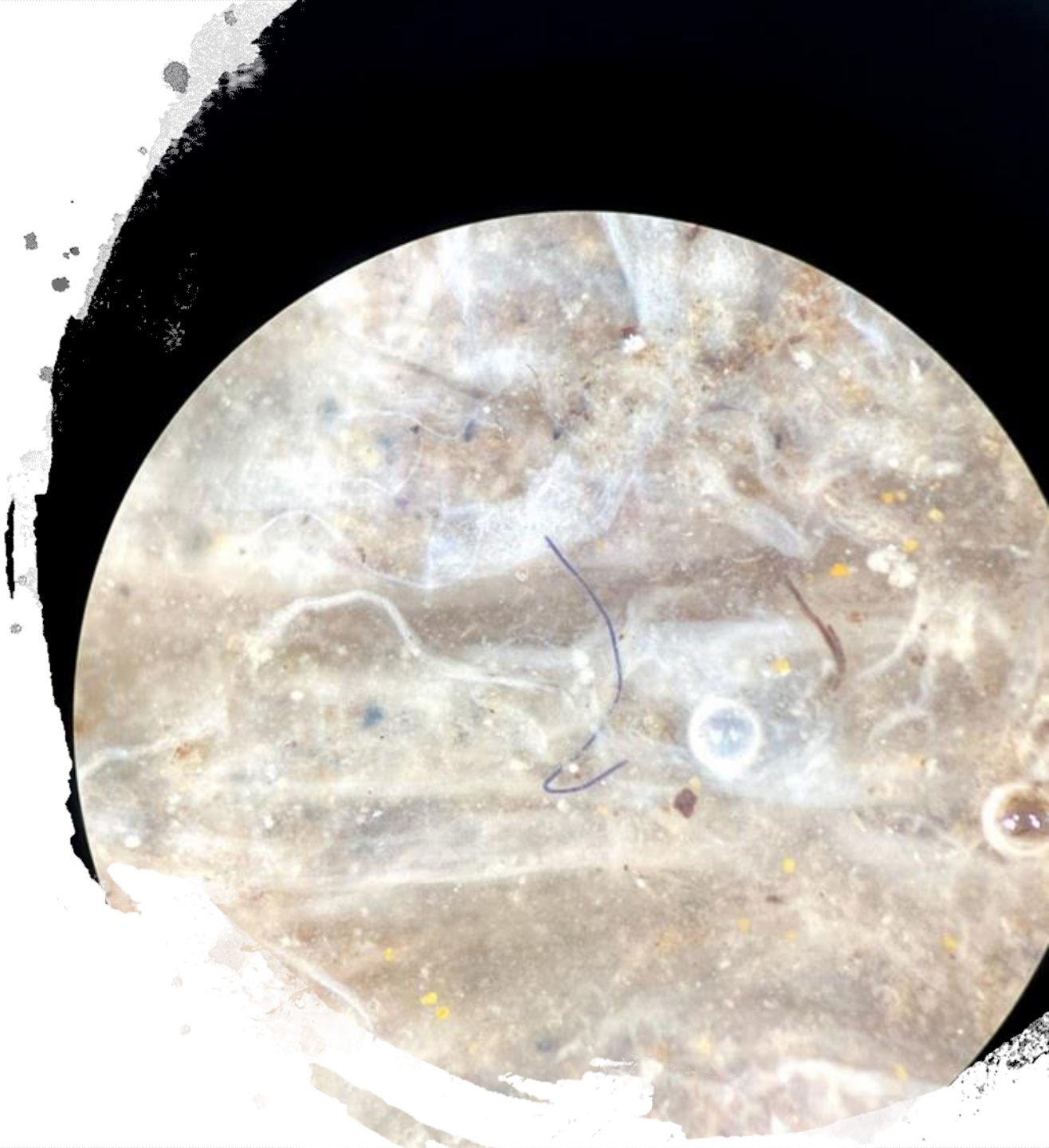
If this is the case, it will effect both the water quality as well as the organisms that live in and use this water

Microplastics

- Microplastics are any plastic particles that are under 5mm in length
- There are two criteria of microplastics: primary and secondary
- Primary microplastics are plastics that are manufactured to be minute such as microbeads and nurdles
- Secondary microplastics come about from the degradation of larger plastics through chemical and physical processes
- Among these two criteria, microplastics can be further specified into foams, pellets, films, fibers, and fragments
- It is now known that microplastics have invaded every aspect of the biosphere, even the hydrosphere

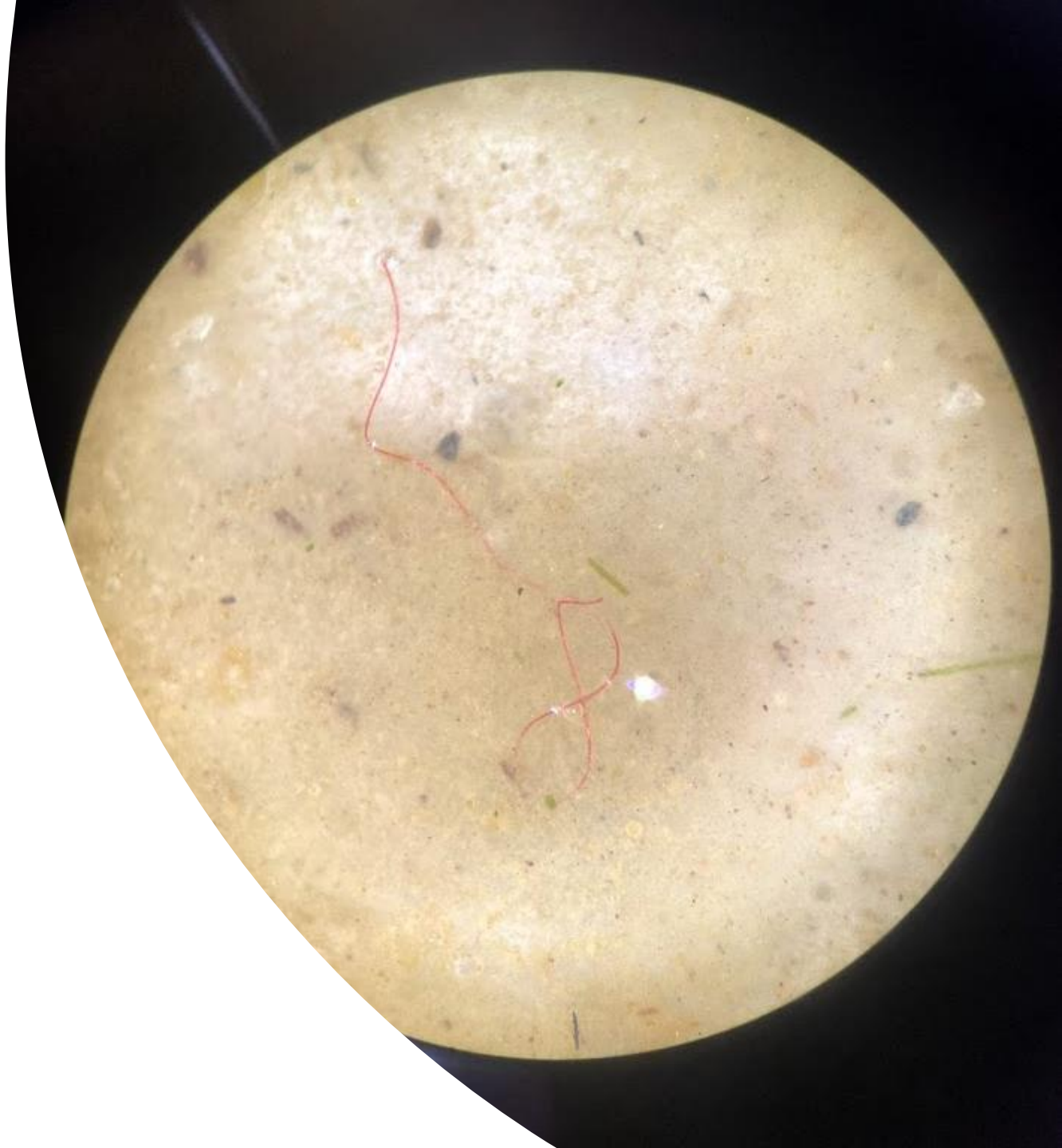
Negative Effects of Microplastics

- Many aquatic organisms including sea turtles, sea birds, and fish have been found with microplastics in their digestive tracts
- These animals either ingest the microplastics from the water/sediment or they acquire them by eating organisms that already have microplastics in their bodies
- When microplastics are passed up through the trophic levels, this is known as biomagnification
- This can lead to a buildup of microplastics in high trophic level organisms
- Microplastics also leach toxic chemicals into the tissues of animals



Negative Effects of Microplastics Continued

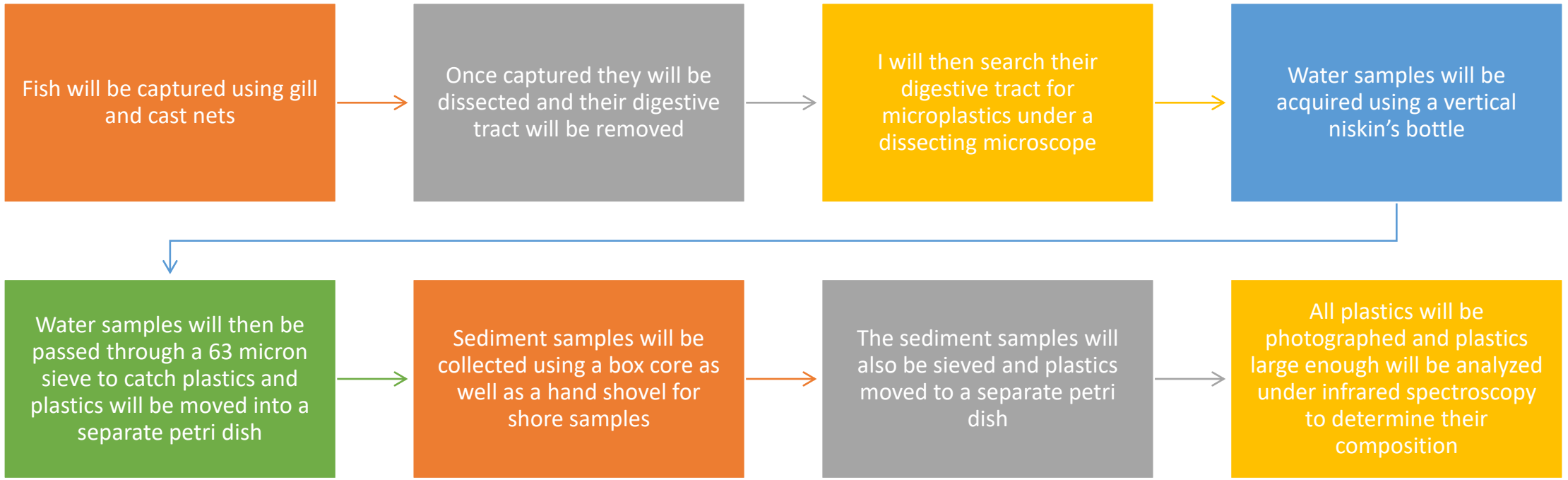
- Microplastics can become tangled in or clog the digestive tract of animals leading to lower rates of consumption, “false fullness”, and starvation
- Other effects of microplastics include symptoms such as inhibited growth and development, oxidative stress, loss of energy, endocrine and neurotransmission dysfunction, and genotoxicity
- The effects of the microplastics on fish and other aquatic organisms ultimately lower their fitness and reproductive capability
- This area of study is critically important for humans as we consume fish and ingest water that could be laden with microplastics



Study Organisms and Locations

- I will be using three different Resaca systems around the Brownsville area including Resaca De La Guerra, Rancho Viejo, the Town Resaca system, and one oxbow lake on the UTRGV campus, Lazano Banco
- I will be obtaining sediment, water, and fish samples from each Resaca system as well as the oxbow lake
- I will be using two species of fish for my study
- I will be using *Pterygoplichthys disjunctivus* (Sailfin Catfish) which is a benthic feeder as well as an invasive species
- I will also be using the native *Dorosoma cepedianum* (Gizzard Shad) which is an important forage fish and food source for larger predators in the Resacas

Methodology

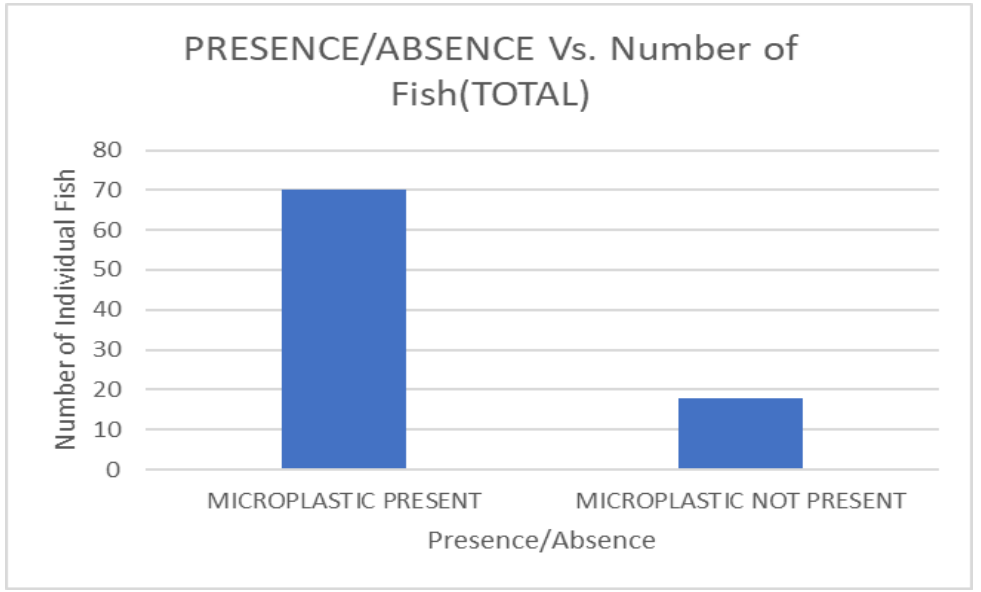


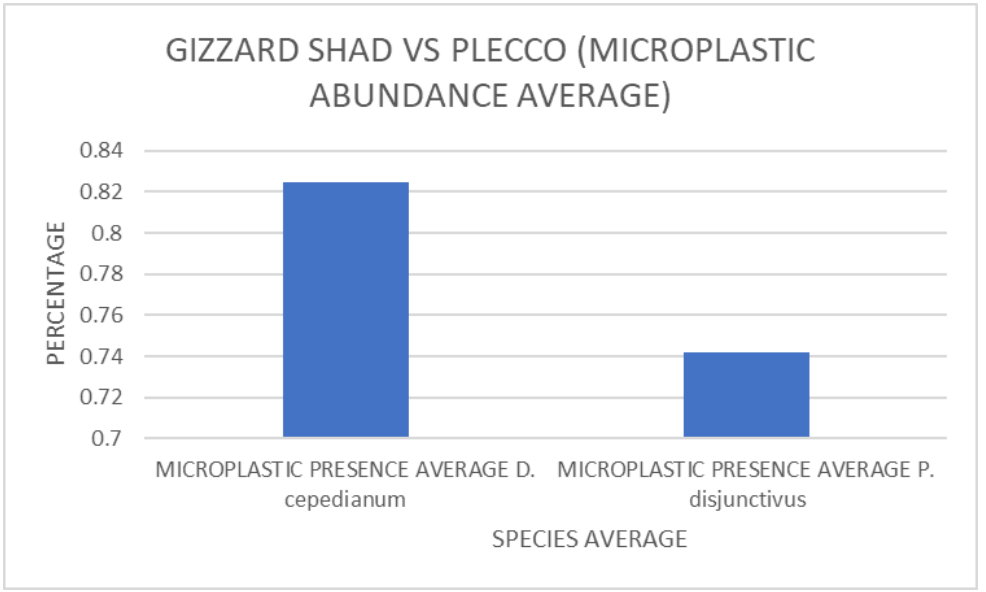
Hypotheses

- We will find microplastics in these Resacas
- There will be a higher abundance of microplastics in the more urban Resacas
- There will be more microplastics in P. disjunctivus than D. cepedianum since P. disjunctivus is a benthic fish
- There will be more microplastics in the sediment than in the water column or fish
- Microfibers will be the most common type of microplastic found
- There will be a positive correlation between body size and presence of microplastics
- There will be a correlation between microplastics found in the water and in D. cepdianum and microplastics found in the sediment and P. disjunctivus

Preliminary Results

- I have collected all my samples and am now in the process of completing fish dissections
- I have dissected 88 fish thus far (57 D. cepedianum/ 31 P. disjunctivus)
- Of the 88 fish, 70 fish contained at least 1 microplastic in their digestive tracts (79.5%)
- D. cepedianum on average was found to have more individuals with microplastics present in their GI tract than P. disjunctivus (82% vs 74%)





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Questions?