



How Do Different Concentrations of Microplastics Affect the Growth of Zebra Fish (*Danio rerio*)?

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DEPARTMENTAL INFORMATION: Environmental Science

Introduction

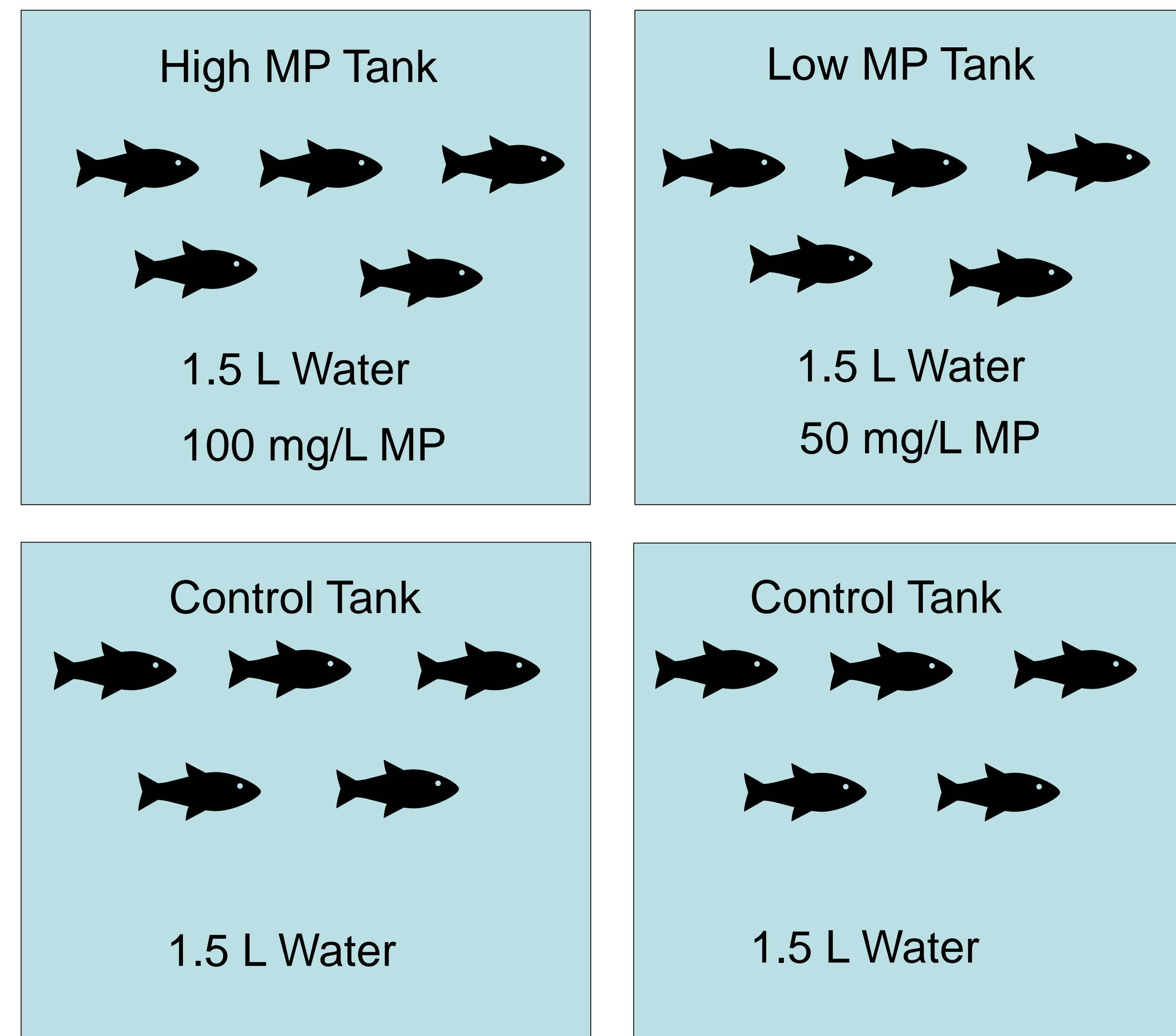
- Fragments of any type of plastic that is less than 5mm in length.
- Two forms of microplastics (MPs): Primary and Secondary
- typically composed of polyethylene, but can also be made up of polypropylene, and nylon.
- Since these are so small in length, MPs can easily pass-through filtration systems which then end up in oceans and lakes posing threats to aquatic life.
- Not uniform in any shape or size; It is hard to prevent from entering the environment.

Background Information

- Some plastic collected from an urban harbor were fed to the juvenile fish for 95 days. Decreased body length and mass was measured with the fish fed plastics compared to the control fish. The survival rate of fish in the plastic treatment was lower when compared to the fish in control treatment (Naidoo et al. 2019).
- Fibers from clothing are one of the main causes of microplastics. Microbeads are another type of microplastic that are usually found in cleaners and exfoliants in personal care products. Like the majority of other studies done, fibers were the most common type of microplastic found. The retention of microplastics may affect the quantity and/or quality of the fishing resources, especially concerning the commercial fish (Sun et al. 2019).
- The plastics that are formed from the breakdown of a larger plastic are usually more irregular in shape. Both types of plastics accumulated in their digestive system. However, unlike the spherical plastics, the irregular shaped plastics decreased the minnows swimming behavior (total distance travelled and maximum velocity)(Choi et al. 2018).
- In another recent laboratory experiment, goldfish were exposed to various shapes including fragments, fibers, and pellets that they ingested via their diet. There was some significant weight loss observed in the exposed fish. The fragments and pellets were not ingested, but they were chewed and expelled out. This resulted in damage to the jaws ranging from exfoliation to deep incisions. (Jabeen et al. 2018).

Methods

- The fish growth was monitored once a week over the course of a two-week testing period.
- Length, width, and weight of each fish was monitored.
- The fish were approximately three months old when I started testing. This was the perfect size since they were easy to handle and still actively growing.



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Results

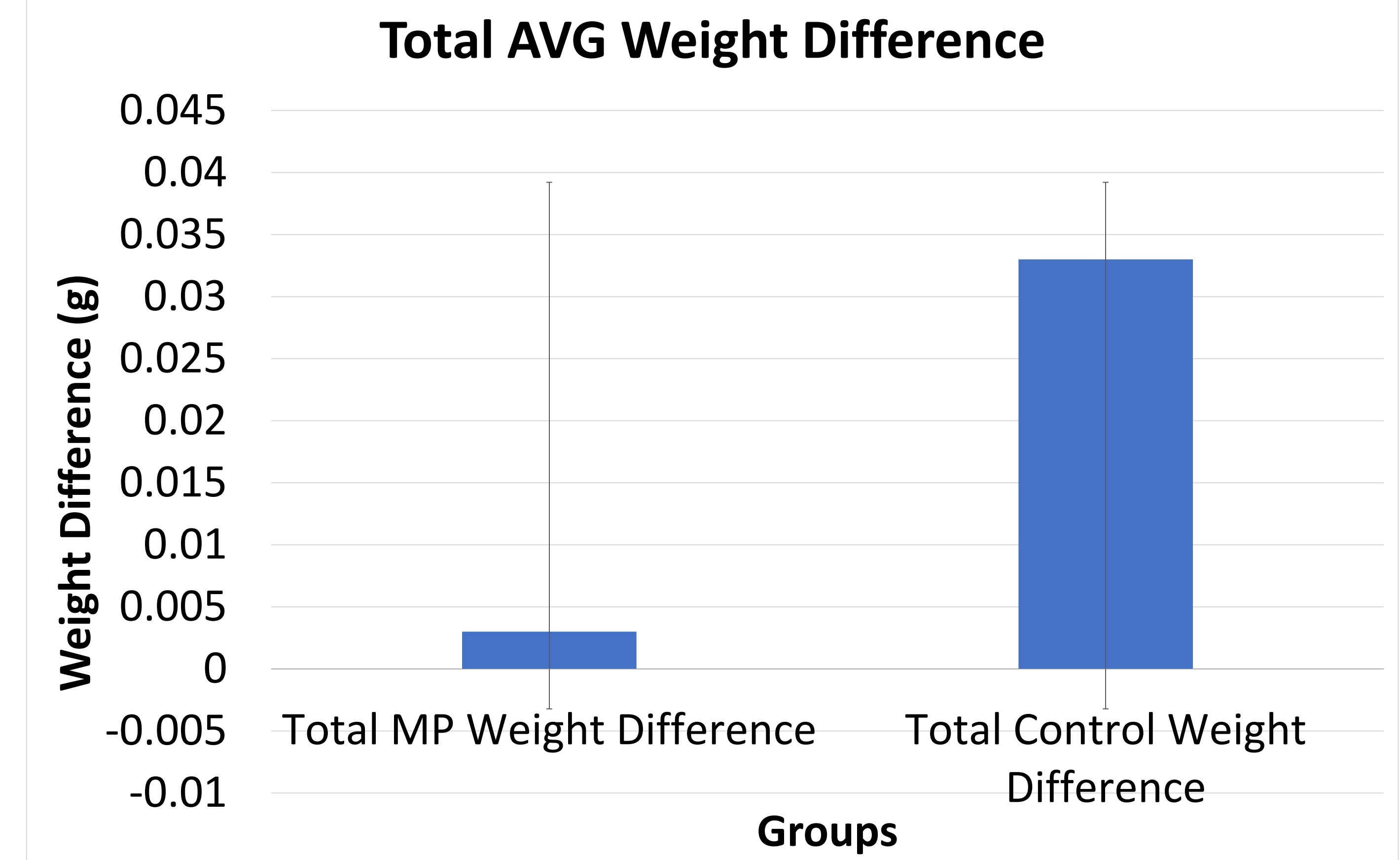


Table 4: Weight differences

Total MP	Total Control
0	0.05
0.02	0.05
0.02	-0.01
0	0.1
0	0.03
-0.02	0.01
-0.03	0.04
0.01	0.02
0.02	0.02
0.01	0.02
AVG: 0.003	AVG: 0.033
Std: 0.017	Std: 0.029
P-Value: 0.01284	

Conclusion

- There was no statistical difference in the change in length between the fish exposed to the microplastics and the control.
- There was also no statistical difference in the change in width between the fish exposed to the microplastics and the control.
- There was a statistical difference in the change in weight between fish exposed to the microplastics and control. The total MP weight difference average was lower than the total control weight difference
- The concentration of MPs does not necessarily matter, but as long as there are MP present in the environment, the weight of the fish will be affected.