



# CALIFORNIA SCIENCE & ENGINEERING FAIR 2019 PROJECT SUMMARY

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<b>Project Title</b>  <b>Which Wastewater Treatment Plant Discharges More Microfibers into Humboldt Bay?</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives</b> My objective was to determine if the retention time of the wastewater from the Arcata Wastewater Treatment Plant (AWTP) and the Eureka Wastewater Treatment Plant (EWTP) affected the number of microfibers discharged into Humboldt Bay.</p> <p><b>Methods</b> I collected water samples from both plants. One of the samples from each plant was during a period when there was no rain for three weeks (12/5/18). The other sample was collected the day after a huge rainstorm (12/21/18).</p> <p>I then used a 47-mm filter funnel, manual vacuum pump and 47-mm .45 micron gridded filters to filter my water samples. I filtered 50ml of wastewater 4X for each plant on the dry and the wet day for a total of 16 separate filter samples. I could only filter 50 ml of wastewater at a time because the wastewater from the AWTP was full of algae that would clog the filters.</p> <p>I then observed each of the filters under an Olympus BH2 Con Focal microscope.</p> <p><b>Results</b> My overall results were 22 microfibers at the AWTP and 29 at the EWTP. Of the 22 at the AWTP there were 10 on the dry day and 12 on the wet day. For the EWTP there were 15 on the dry day and 14 on the wet day.</p> <p><b>Conclusions</b> My conclusion is that the retention time of the wastewater at the sewage treatment plant has an important role in the number of microfibers discharged from each plant. On 12/5/18 the retention time was 30-40 days at the AWTP versus 1-2 days at the EWTP. On 12/21/18 the retention time was 10 days at the AWTP compared to one day or less at the EWTP. The longer retention time at the AWTP is due to their unique pond/marsh system. At the AWTP there were less microfibers counted on the dry samples that had a longer retention time, 20-30 days longer than the wet samples. However, there were more microfibers on the dry day, 15 microfibers, compared to 14 microfibers at the EWTP. I believe this difference is due to the fact there was not much of a difference in retention time between the dry and wet period at the EWTP.</p>	
<b>Summary Statement</b>  I showed that the retention time of wastewater at the wastewater treatment plant can reduce the number microfibers discharged from the plant.	
<b>Help Received</b>  I received help from Maia McGuire from the Florida Microplastic Awareness Project, University of Florida. She helped me with the materials I needed and the filtration process. I also received help from Megan Smith-Zagone, M.D. whom helped me with the use of the microscope.	