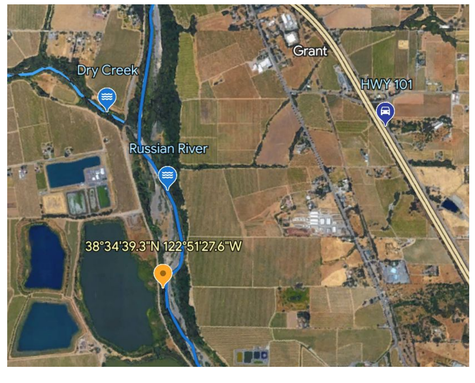
# Magnetic Levitation (MagLev) to Isolate and Evaluate Micron-sized Particles In the Russian River

SONOMA STATE UNIVERSITY

Camila Carrillo, Cesar Torres, Catherine Kingsbury, Ryan Grumich, Sujan Bhattarai, Manza B.J. Atkinson

## Background

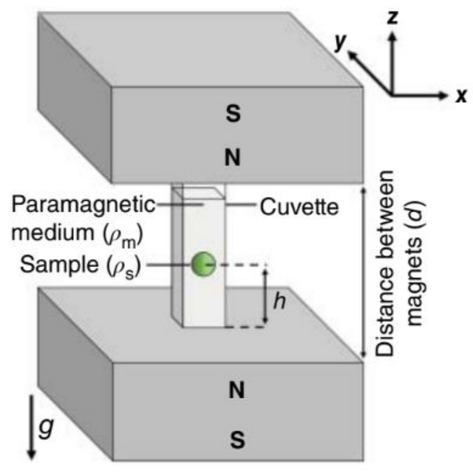
- Microplastics threaten human health and ecosystem sustainability
- Current density-based methods: sink-float method and sucrose density gradient
- Goal: Diagnose microplastic contamination in the Russian River
- Aid policymakers and Sonoma County residents in waste management habits
- Hypothesis: MagLev is a viable technique for analyzing crude microplastic samples

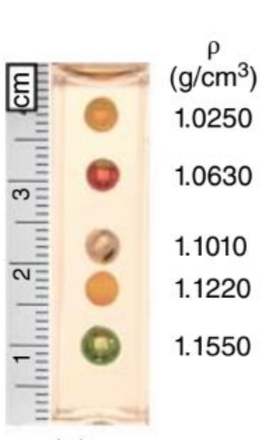


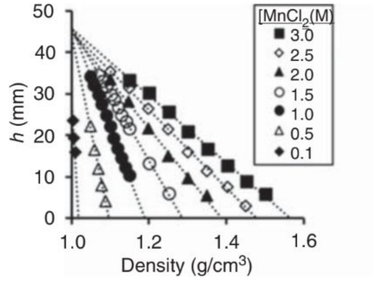


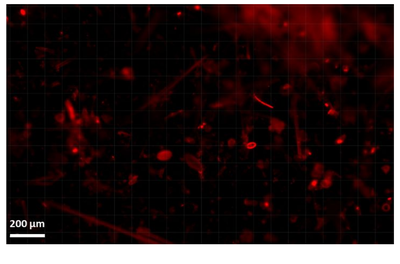
## Methods

- Plankton net of 50 micron pore size to collect samples at the Russian River's confluence with Dry Creek
- 30% $H_2O_2$ and nile red dye to detect synthetic material




## Results

- Constructed MagLev device and developed solution for sample analysis. Used density standard beads of 0.9, 1.03, and 1.3 g/cc and a cis cinnamic acid crystal with a density of ~1.2 g/cc
- SEM reveals mixture of particles

## Future Directions

Identify microplastics by elimination and reference to plastics of known density. Potential projects include distinguishing plankton organisms.

## Acknowledgements

Sonoma State University Department of Chemistry, Center for Environmental Inquiry, Russian River Water Keepers

**References: [1]** C. K. Abrahamsson, S. Ge, J. Bell, R. Blackledge, and G. M. Whitesides. 2022. "Chapter 4: Density Determination and Separation via Magnetic Levitation." In Leading Edge Techniques in Forensic Trace Evidence Analysis: More New Trace Analysis Methods, 1st ed., Pp. 103-147. John Wiley & Sons, Inc.
**[2]** Google Earth. https://earth.google.com/web/@38.58315639,-122.85615592,25.11136744a,4056.90481459d,30y,0h,0t,0r/data=MikKJwolCiExWll5Wnd4RjdId25qc1Z4WkpUWjdi UXpVaHNZdWl5ejYgAQ (accessed 2023-04-26).
**[3]** 38°34'39.3"N 122°51'27.6"W. Google Earth. https://www.google.com/maps/place/38%C2%B034'39.3%22N+122%C2%B051'27.6%22W/@38.5777071,-122.8600251,718m/data= !3m1!1e3!4m5!3m4!4b1!8m2!3d38.5775833!4d-122.8576667!5m1!1e4 (accessed 2023-04-26).