

OEDG: SoundCitizen Apprenticeship Program for High School Students



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About Us

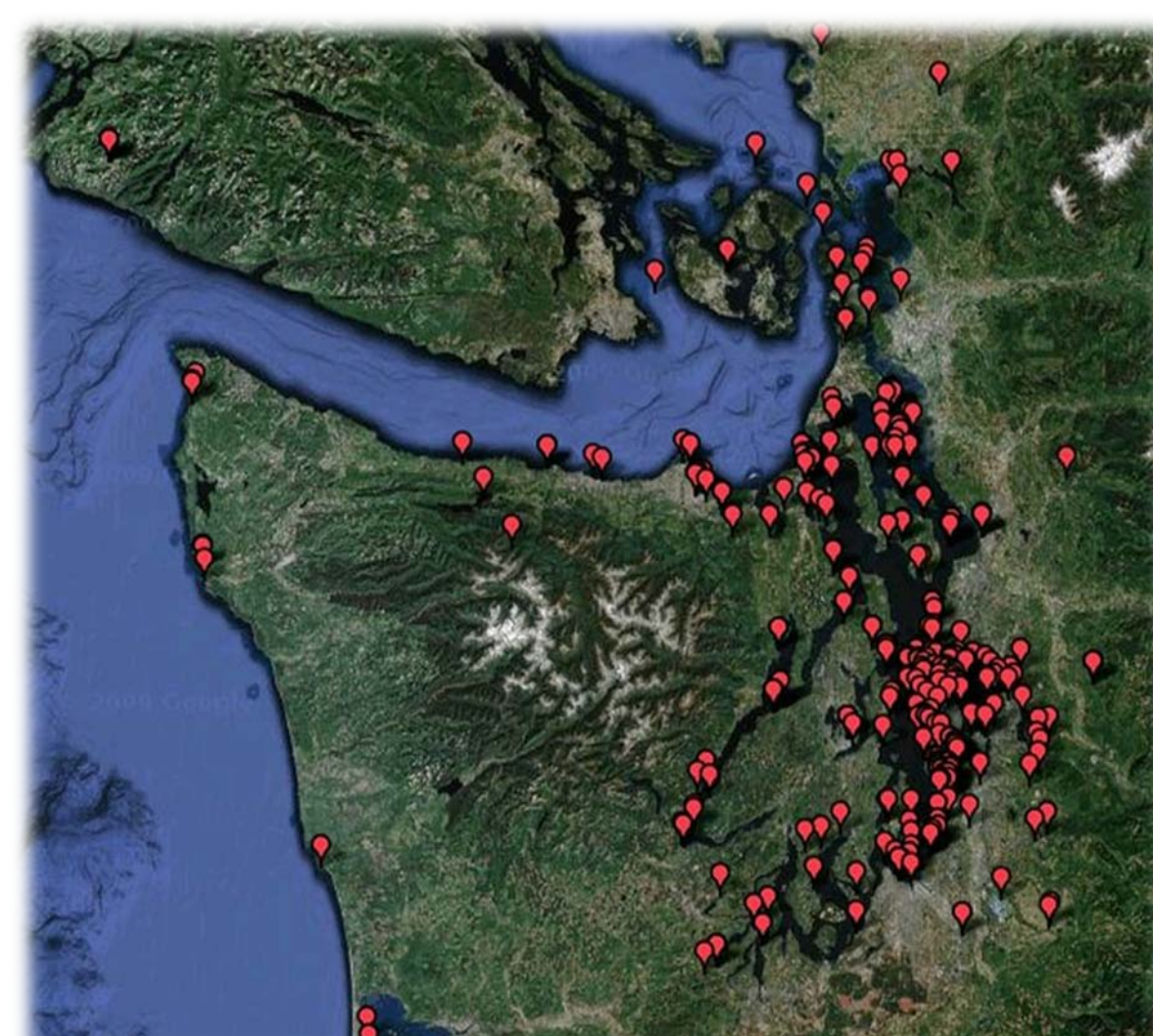
In the fall of 2009, eight students were selected from a pool of applicants to participate in the first year of the program. We are all alumni of the youth-enrichment programs Passages Northwest or BOLD (Boys Outdoor Leadership Development). We range from 8th- 12th grade, attend seven different schools, and live broadly distributed throughout the Seattle area. Each week we come to the University of Washington to work as part of SoundCitizen. We gave extensive input to create the research project described in this poster, collected all the samples and processed all the data presented here.

About The Program

The SoundCitizen Apprenticeship Program brings geosciences research to high school interns from the Seattle metropolitan area. SCSAP is a new partnership between the University of Washington's School of Oceanography, the UW Institute for Science and Mathematics Education, and two youth groups from South Seattle: Passages Northwest and BOLD (a subsidiary of YMCA-Seattle). Apprentices identify locally relevant geochemical questions about terrestrial, riverine and marine water quality, and investigate these in collaboration with University of Washington's SoundCitizen Program.

About SoundCitizen

SoundCitizen investigates the connection between Pacific Northwest watersheds and their receiving waters, Puget Sound. Citizen volunteers, in collaboration with University of Washington scientists, collect water samples from a variety of locations (creeks, lakes, storm drains, Puget Sound) and then mail the samples back to the lab to be analyzed for fun compounds (cooking spices) and serious compounds (emerging pollutants). SoundCitizen has more than 300 volunteers who help collect samples.



In 2009 nearly 1000 water samples were collected. <http://soundcitizen.org>

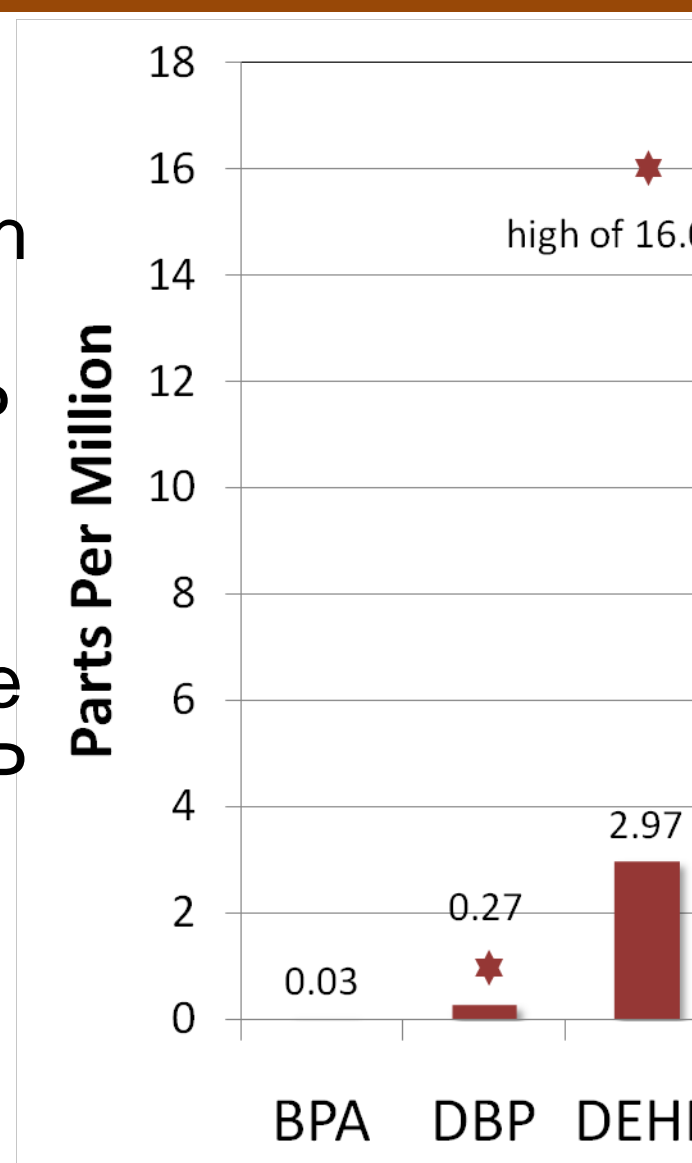
Our Research: Plasticizers in the Environment

Introduction

Plasticizers are a worldwide environmental problem because they are being released into the environment at alarming rates and they are known to be harmful to animals in high doses. The USA generally has much higher levels of plasticizers in lakes, rivers, and streams than Europe does. In some places in the USA, there are higher levels of the chemical bisphenol (BPA) in water, sediment, and sewage than is thought to be a safe exposure level (0.0001 ug/kg/d; Klecka et al., 2009). In their review paper, Klecka et al. (2009) said that there were no peer-reviewed research papers that studied the levels of plasticizers in marine water samples in the US. We decided to evaluate our local seawater from Puget Sound for pollutants, and also to be among the first to cross-compare drinking water to environmental samples.

Results

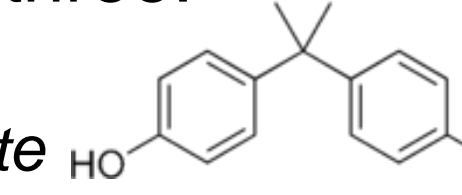
We collected 23 samples, 5 salt water, 7 fresh water and 11 drinking water. Overall, the most abundant plasticizer is DEHP, then DBP then BPA. DEHP is found at 3 parts per million while BPA is found at about 20 parts per billion. The small pond by Helber's house had the most BPA (20 ppb) and the most DBP (1.6 ppm). Water from the beach near Rolando's house, and from the sink in the art room at Sumaya's school had really high amounts of DEHP (12.3 and 10.4 ppm).



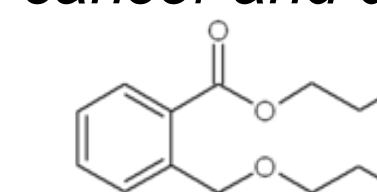
What are Plasticizers?

Plasticizers are organic compounds added to things in order to help them be bendable or flexible. We measured three:

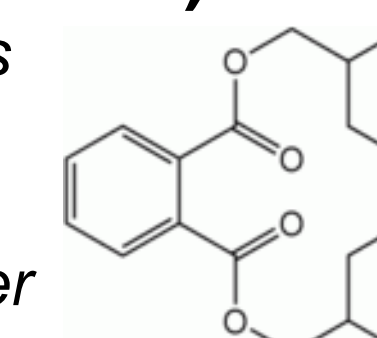
Bisphenol A (BPA) is found in some polycarbonate plastics and is known to cause cancer and diseases.



Dibutyl phthalate (DBP) is another common plasticizer. It can cause obesity and cancer.

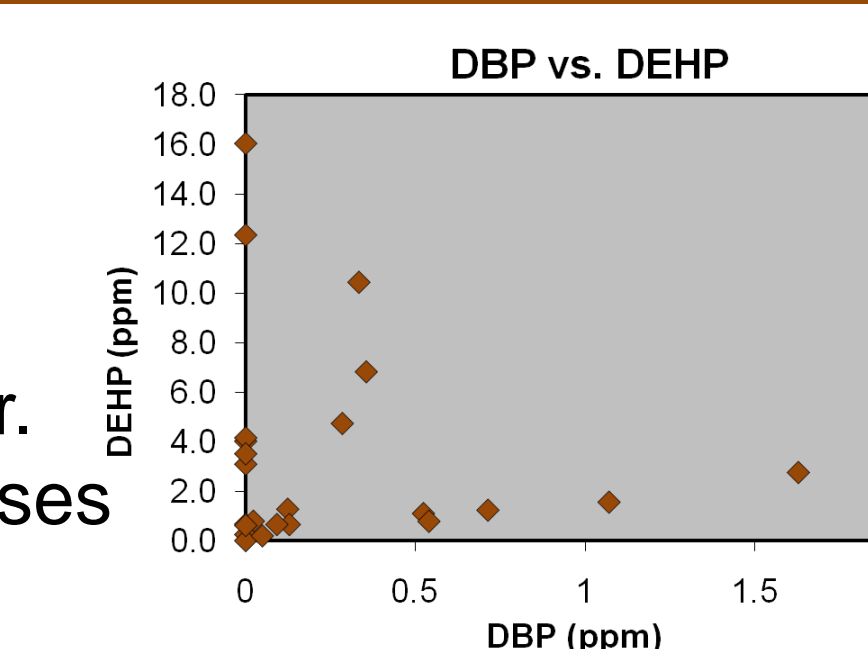


Diethylhexyl phthalate (DEHP) is found in PVC pipes and toys and is the most abundant plasticizer found in European waters. It causes, among other things, obesity and heart disease.



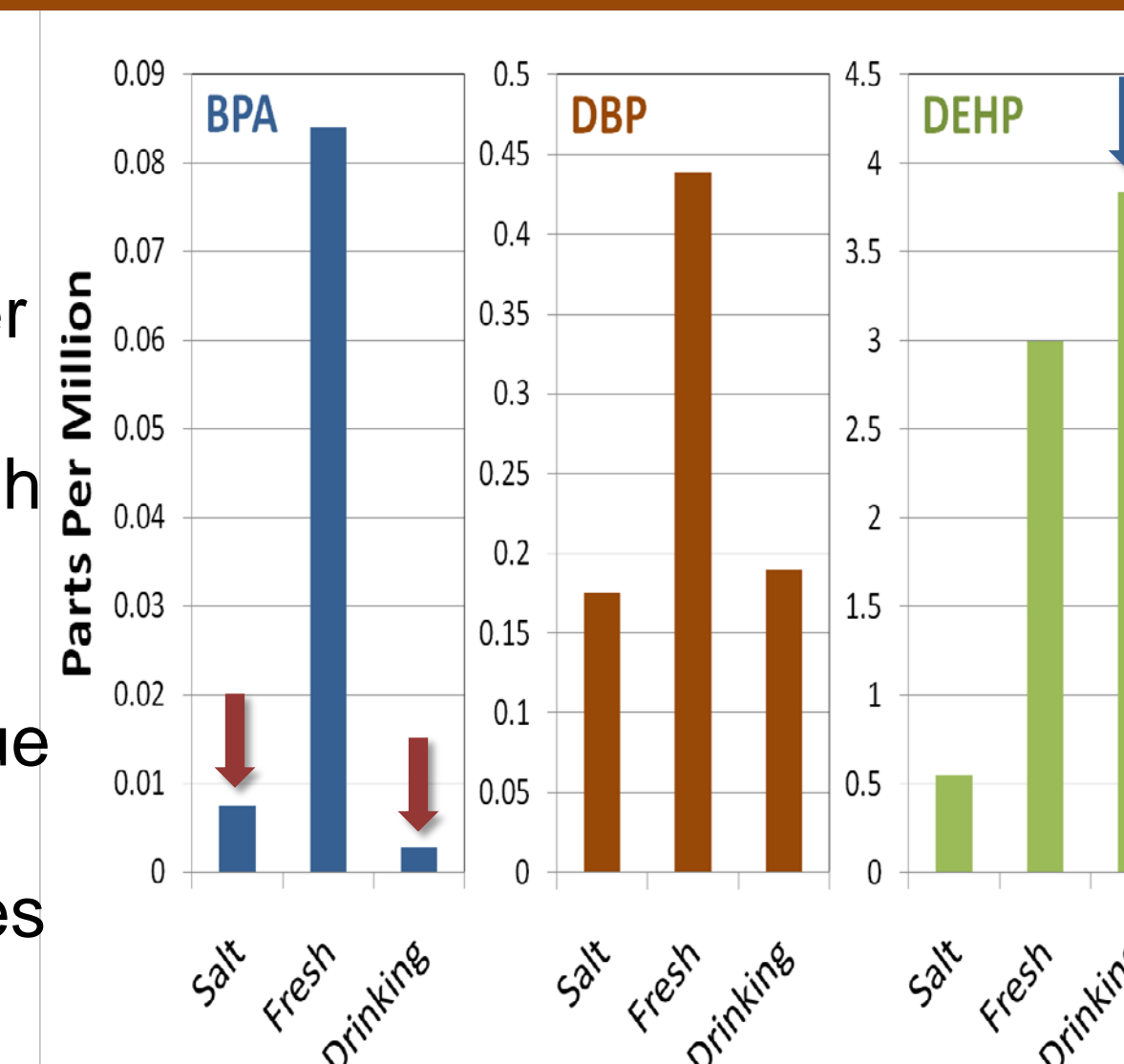
Co-vary?

Each compound does not directly relate to the other. When one increases it does not mean that the other will as well, as you see in the graphs, the data randomly vary. According to Fromme et al. (2002) this is actually the typical thing scientists see.



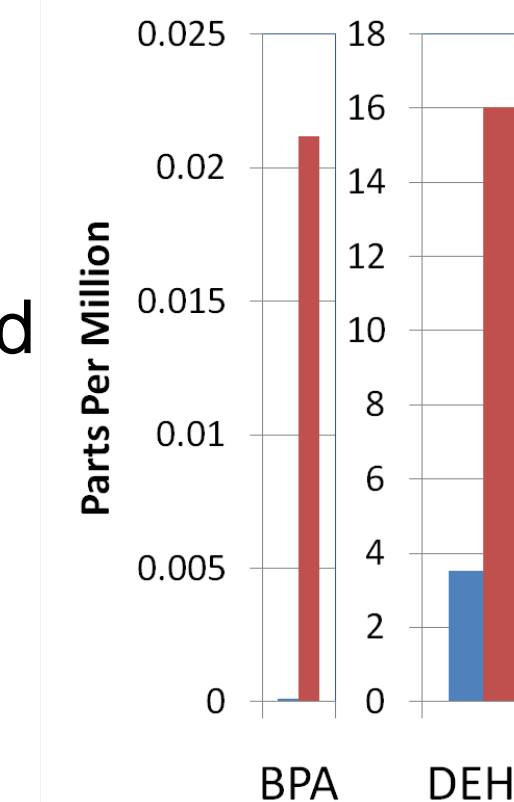
Results

(Note that the scales change.) There is more BPA in salt water than in our drinking water (red arrows), and even more in fresh water. Fresh water has the most DBP. DEHP is most abundant in drinking water (blue arrow), maybe because the pipes that bring water to houses often are made of PVC.



Water in Warm Bottles

We read that sometimes plasticizers leach out of drinking bottles when the bottles get warm. We warmed water in a green 2-liter soda bottle and the amount of BPA went up 200 times! And the amount of DEHP went up 4 times.



Methodology (Lab Analysis)

First we got our samples and followed the SoundCitizen kit instructions. We filled out the information sheet and brought the water samples to the lab. We filtered the water and added acid to it to stabilize it. Then Brittany taught us how to get the chemicals onto the cartridge. We used a graduated cylinder so we could measure the volume of our sample. It takes a long time to do an extraction. Then Brittany and Jaqui went into the other lab and used Jaqui's technique (Keil and Neibauer 2009) to measure the plasticizers in our samples. That consists of squirting the samples into a gas chromatograph mass spectrometer (GC-MS) and using something called SIM mode. We got the data and made our graphs. After this conference, we will learn this part of the methodology so that we can do it ourselves.

References

- Fromme, H. et al., 2002. Occurrence of phthalates and bisphenol A and F in the environment. *Water Research*, 36(6): 1429-1438.
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