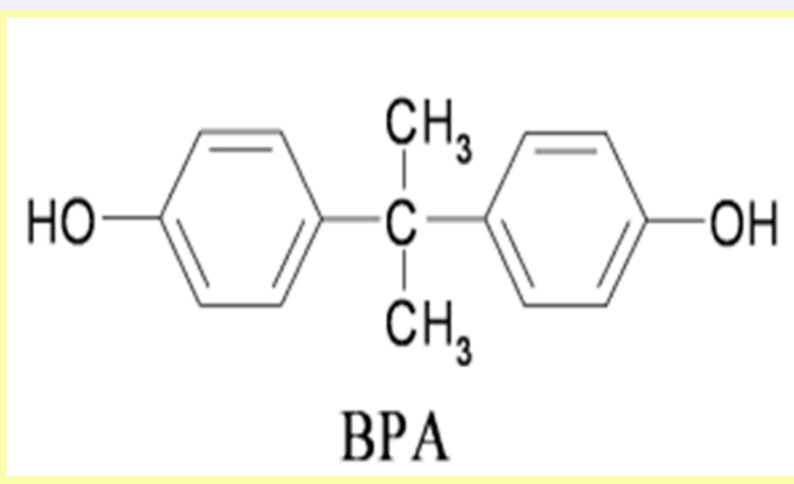


Investigation of Bisphenol A contamination in Sharp Mountain Creek from a construction waste disposal site.

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Abstract

Bisphenol-A, also known as BPA, is a synthetic product used in the creation of many plastics, including PVC pipes and other materials used in the construction industry. BPA is a chemical of concern because it is an endocrine disrupter. This chemical has been shown to act as a hormone in the body and cause physiological abnormalities, especially in reproductive systems during specific periods of development. Furthermore, this chemical is prevalent in the environment and thereby could be affecting wildlife. Many studies have reported adverse effects in wildlife, particularly in aquatic organisms, at much lower concentrations than those deemed safe by the US Environmental Protection Agency. Even small effects on reproductive function in some species could reduce and eventually decimate their populations, therefore it is important to identify possible point sources of contamination and monitor our local waterways. In this study, an enzyme linked immunosorbant assay was used to determine BPA levels in water above and below a landfill used by construction companies. It was hypothesized that this landfill may be a source of BPA contamination in the stream. Researchers expect to detect BPA at greater concentrations below stream of the landfill than above stream.

Background

- ❖ What is BPA?
Bisphenol A is a synthetic compound used in the creation of plastics.
- ❖ Where is BPA found?
Because of our monumental use of plastics and water treatment plants' inability to remove BPA from the water, BPA is abundant in the environment_[1].
- ❖ How does BPA affect organisms?
BPA acts as an endocrine disrupter in organisms. Specifically, it acts like estrogen and can cause significant effects in reproductive development and secondary sex characteristics_[1-3].
- ❖ Why is BPA significant?
In addition to potentially decreasing species populations directly by decreasing individuals' fertility, BPA has also been shown to increase interspecies mating in fish, thus decreasing species richness_[4].

Methods

Sampling

- Weekly samples were collected from 2 sites along Sharp Mountain Creek, one above stream of a construction waste site and one below, over a 28 day period (n=5).
- Samples were obtained using the grab sample technique from 3 separate locations at each site.
- Samples were filtered using 1 micron glass fiber filters (Pall Corporation) and stored in glass containers at 4°C until ELISA was run.

HPLC

- BPA was extracted from individual samples via HPLC using Nexus cartridges (Agilent Technologies) as per the ELISA protocol from Abraxis.

ELISA

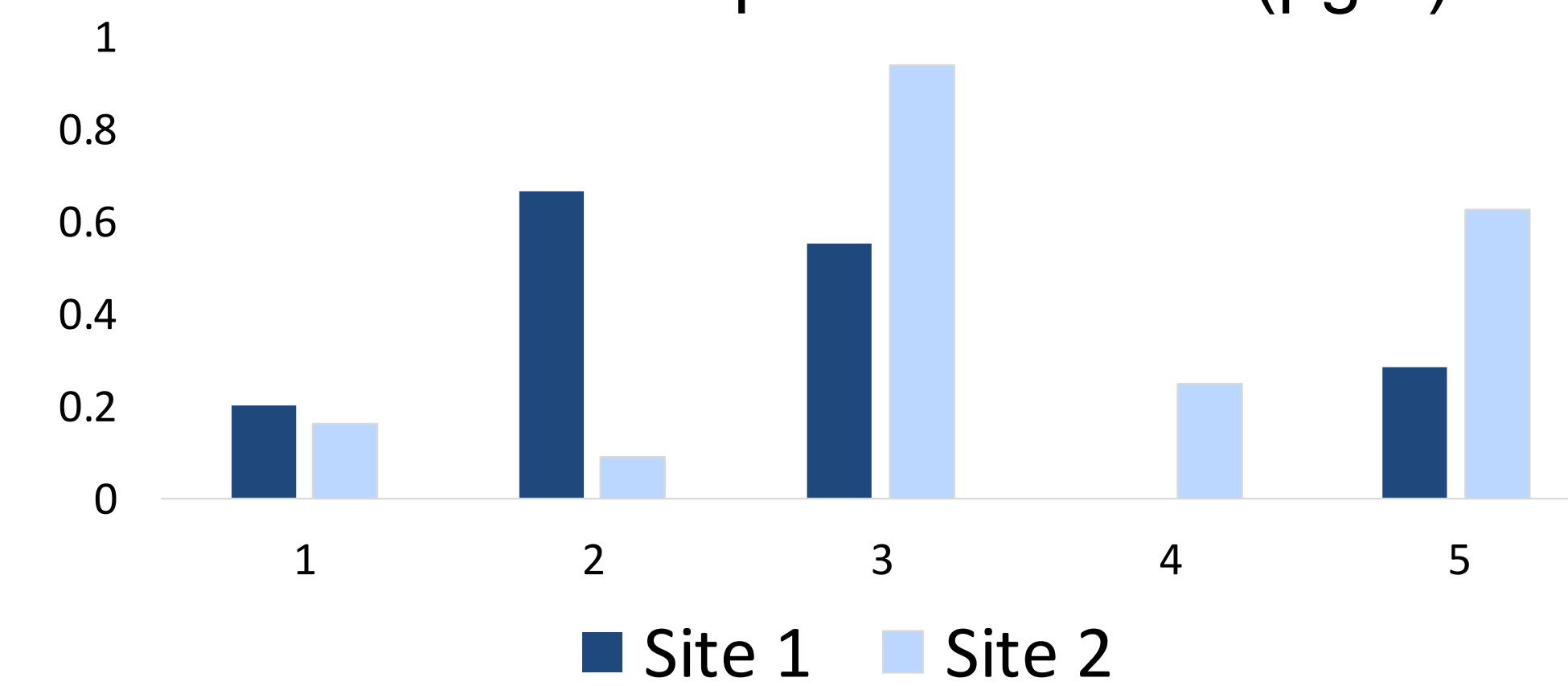
- Ecolgiena BPA ELISA (Abraxis) was used to determine BPA concentrations.
- Samples were run in triplicate using the manufacturers protocol.
- Absorbance was measured at 450 nm and a standard curve was used to interpolate BPA concentration in each sample. The averages for each week at each site were then compared using a paired t-test.

Hypothesis

It was hypothesized that BPA would be found at environmentally relevant concentrations in Sharp Mountain Creek and that levels would be higher below stream of a construction waste site.

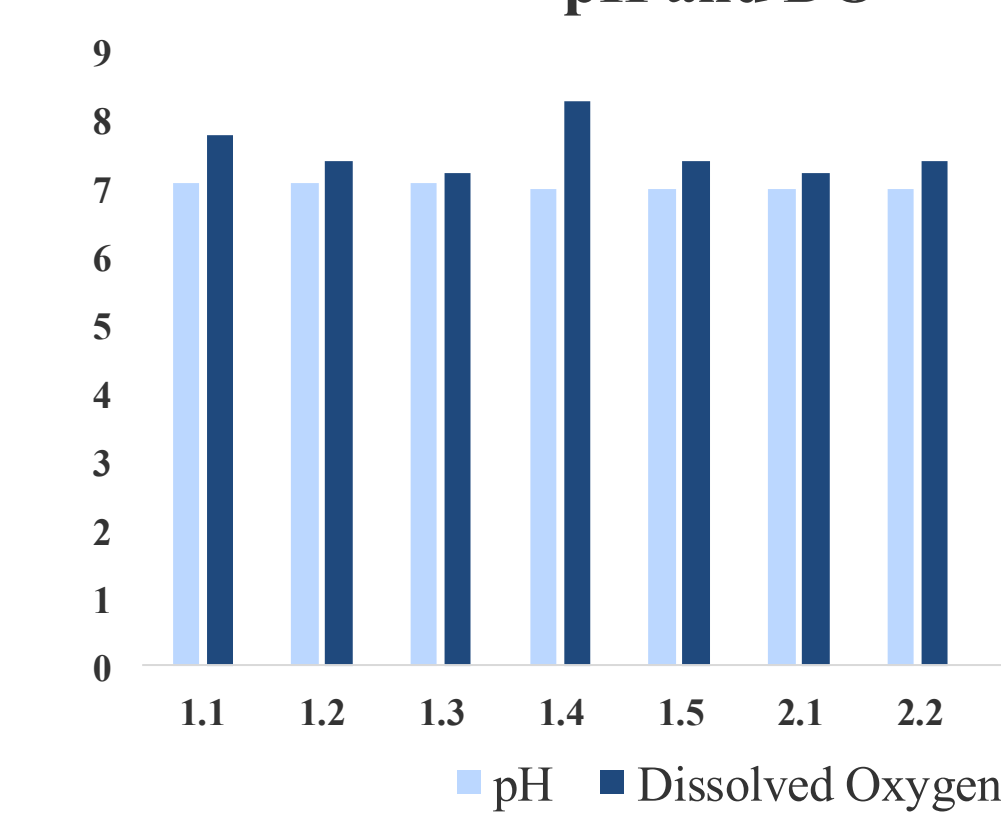
Results

Average BPA concentrations for each sample at each site (µg/L)

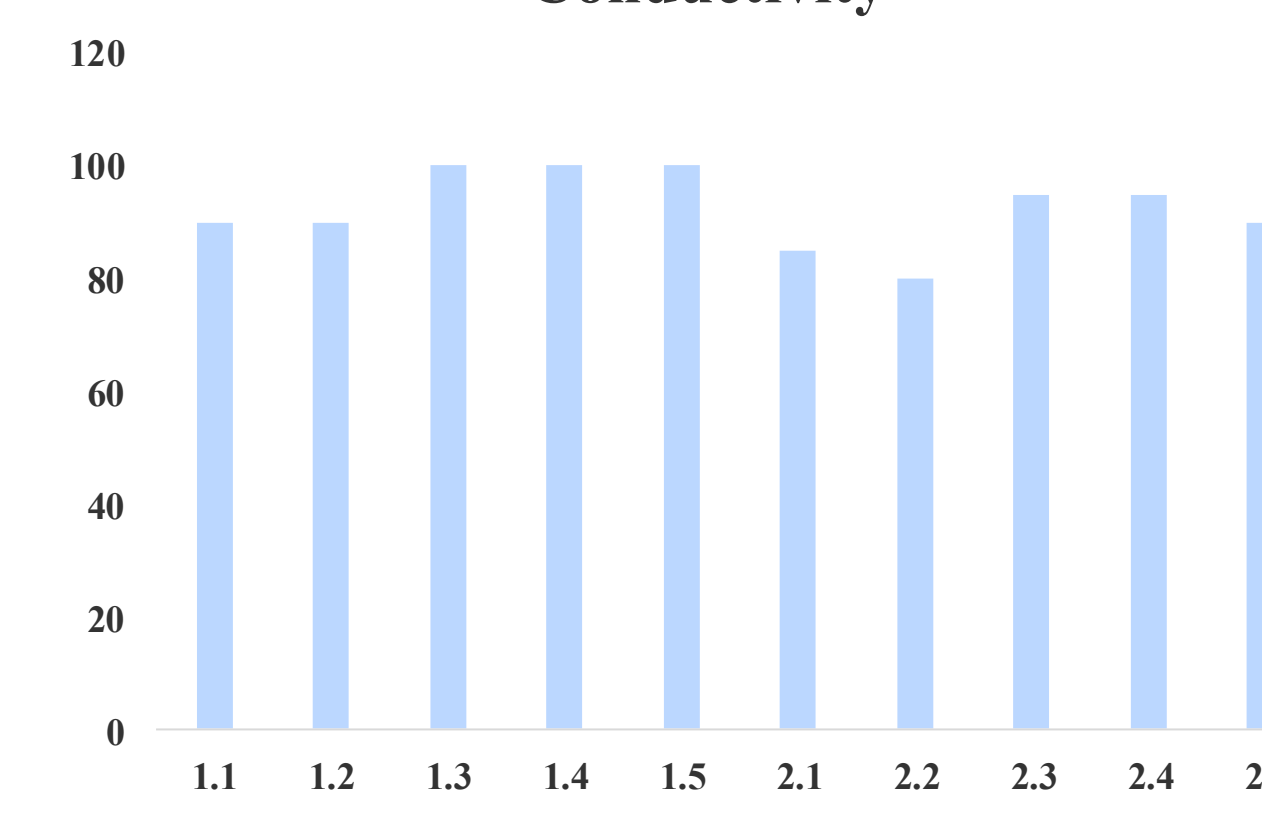


Sample	1	2	3	4	5
Site 1	0.201	0.667	0.555	15.348	0.286
Site 2	0.160	0.090	0.942	0.250	0.627

pH and DO



Conductivity



Week	Site 1					Site 2				
	1	2	3	4	5	1	2	3	4	5
Air Temperature	24.0 C	23.5 C	24.0 C	25.5 C	24.0 C	25.1 C	27.0 C	26.0 C	26.5 C	24.0 C
Water Temperature	23.2 C	24.1 C	23.3 C	23.8 C	24.4 C	23.1 C	23.9 C	23.5 C	23.4 C	24.6 C
pH	7.1	7.1	7.1	7	7	7	7	7	6.8	7
Dissolved Oxygen (mg/L)	7.8	7.4	7.25	8.3	7.4	7.25	7.4	7.8	8.4	
Conductivity (µs/cm)	90	90	100	100	100	85	80	95	95	90

Works Cited

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Acknowledgments:

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CONCLUSIONS

- ❖ Sharp Mountain Creek appears to be healthy. General water quality measures were within recommended limits and BPA concentrations were low at both locations tested.
- ❖ While BPA concentrations were low, it is present in this otherwise pristine environment. Though few studies have been conducted at these concentrations to determine possible effects at these levels, there is some evidence that levels as low as .25µg/L can have a negative impact on the reproductive systems of aquatic organisms_[2].
- ❖ Levels of BPA did not differ significantly above and below stream (p=.68).
- ❖ Sample 4 from above stream contained a much higher concentration of BPA than other samples (15.348µg/L). It is possible that BPA was more highly concentrated because it had been extremely dry and water levels were very low, however, this was not the case at the site below stream so it is also possible there was some human error. This sample was therefore omitted from the t-test.

Future Objectives

Additional studies are needed to:

1. Further determine a norm for BPA levels in natural water systems.
2. Assess the possible impact of BPA exposure on aquatic wildlife at environmentally relevant concentrations.
3. Assess the possible impact of BPA exposure on aquatic wildlife in the immediate areas where BPA was detected.
4. Investigate whether BPA contamination is greater during dry conditions.



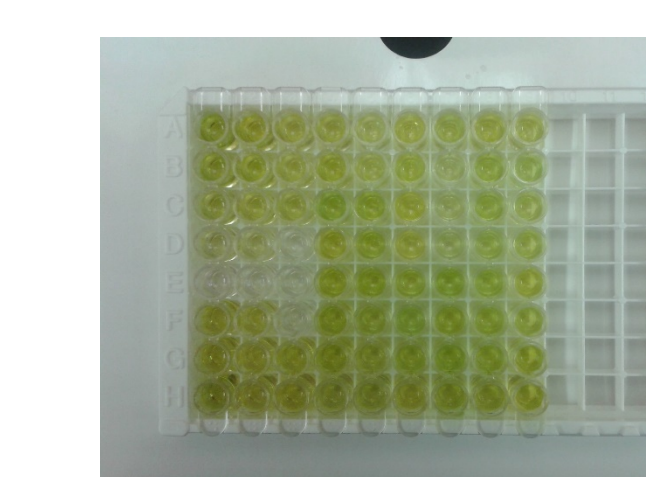
Site 1
Above stream



Site 2
Below stream



HPLC Apparatus



ELISA Plate



HPLC