ALEWIFE RESERVATION
Little River water quality

Leena Akram-Boshar on Temperature

John Dunn and Jaqui Hill on the Nitrogen Compounds

Nina Angell on PH

Luca Johnson on Dissolved Oxygen and Salinity

Annike Green on Bacteria

There are many components in overall water quality, and we as a class have begun to study the Little River water, and the things we can do to improve the environment around us. Some of the topics we connected were TEMPERATURE, DISSOLVED OXYGEN, COLIFORM BACTERIA, HEAVY METALS, AMMONIA

Causes and Context of Coliform

Coliform bacteria is present in the Alewife Reservation river water, both in the pond and in the lake. Coliform bacteria can come from dead animals, plants, and fecal matter. Coliform can be an indicator of disease causing bacteria, but is generally not dangerous. Coliform is very common and can come from the environment. Some recommendations I have for future visitors is to not let your dogs produce fecal matter upon the alewife territory.

I found coliform in all of my alewife field tests.

DISSOLVED OXYGEN AND TEMPERATURE

Dissolved oxygen is very highly affected by temperature of the water. Dissolved oxygen is essential to making sure the water can sustain life. Without oxygen in the water, the fish and other life forms that breathe in the water will die because they, like humans need oxygen to survive. Stagnant water will most likely kill animals living in the water. Dissolved oxygen is clearly correlated with temperature because when the temperature was colder (38.1 F) the dissolved oxygen levels were higher (7.7) and when the temperature was significantly higher (50.9 F) the dissolved oxygen levels were lower (6.5).

CHANGES AND DISSOLVED OXYGEN

On our final visit to Alewife brook, the dissolved oxygen levels seemed surprisingly high at an unusual level of 14.5 on the meter. Our previous data had numbers in the 7 region. This number was unprecedented but the circumstances were also much different than what we had seen before. The water was not clear at all anymore and had a lot of oil and pond weed and algae. The temperature of the water was also at 73.5 which was very unusual. Our hypothesis about the high levels of dissolved oxygen is that the algae produced high levels of oxygen and also protected the water we tested from sunlight which makes it hotter. We don't know if this hypothesis is correct but we hope these changes in water quality are not permanent because the wildlife relies on a consistent amount of dissolved oxygen

TEMPERATURE

Temperature is very important to everything at Little River. Temperature affects bacteria, and the Nitrogen compounds. If temperature is too high it highly impacts the water and especially bacteria. If the bacteria gets too high it can kill animals and plants very quickly. This can be good and bad though. If the water gets too hot it can hurt and or kill plants which can be very bad for the environment.

LITTLE RIVER'S EXPOSURE AND HOW THE TEMPERATURE AFFECTS IT

There are many trees hanging over the river so they create shade. When there is shade the water tends to stay cooler than if the water was exposed to sunlight. Also the water is dark at little river and when the water is darker sunlight is more attracted to that than clear water. It's just like when you wear dark clothes you tend to be hotter because the sun is attracted to darker items.

LITTLE RIVER PLACEMENT AND TEMPERATURE

Little River is very close to Alewife Brook Parkway. Because Alewife Brook Parkway is a dark paved road it absorbs the heat and when it rains the water touch the hot surface of the road then travels down into the Little River. If the storm runoff is near a street or something it can cause the water to get warmer. And if we want the Little River to “survive” there needs to be less exhaust from all the cars passing by as people get to work. Maybe we can change the highway into like a bike and walking around only highway.

PH

Ph measures how acidic or basic the water is. According to the World Health Organization, health effects are most pronounced in pH extremes. Drinking water with an elevated pH above 11 can cause skin, eye and mucous membrane irritation. On the opposite end of the scale, pH values below 4 also cause irritation due to the corrosive effects of low pH levels. Water with relatively low pH (acidic) can also reduce the hatching success of fish eggs and irritate fish and aquatic bugs, gills and damage membranes. Amphibians are particularly vulnerable, probably because their skin is so sensitive to pollutants. Some scientists believe the recent drop in amphibian numbers around the world is due to low pH levels caused by acid rain.

Pine or fir needles can also decrease the pH of soil, and any water that runs over it, as they decompose. Intense photosynthesis increases the pH of water as it removes CO_2, though this change is usually diurnal.

The Nitrogen Cycle and Nitrogen Compounds

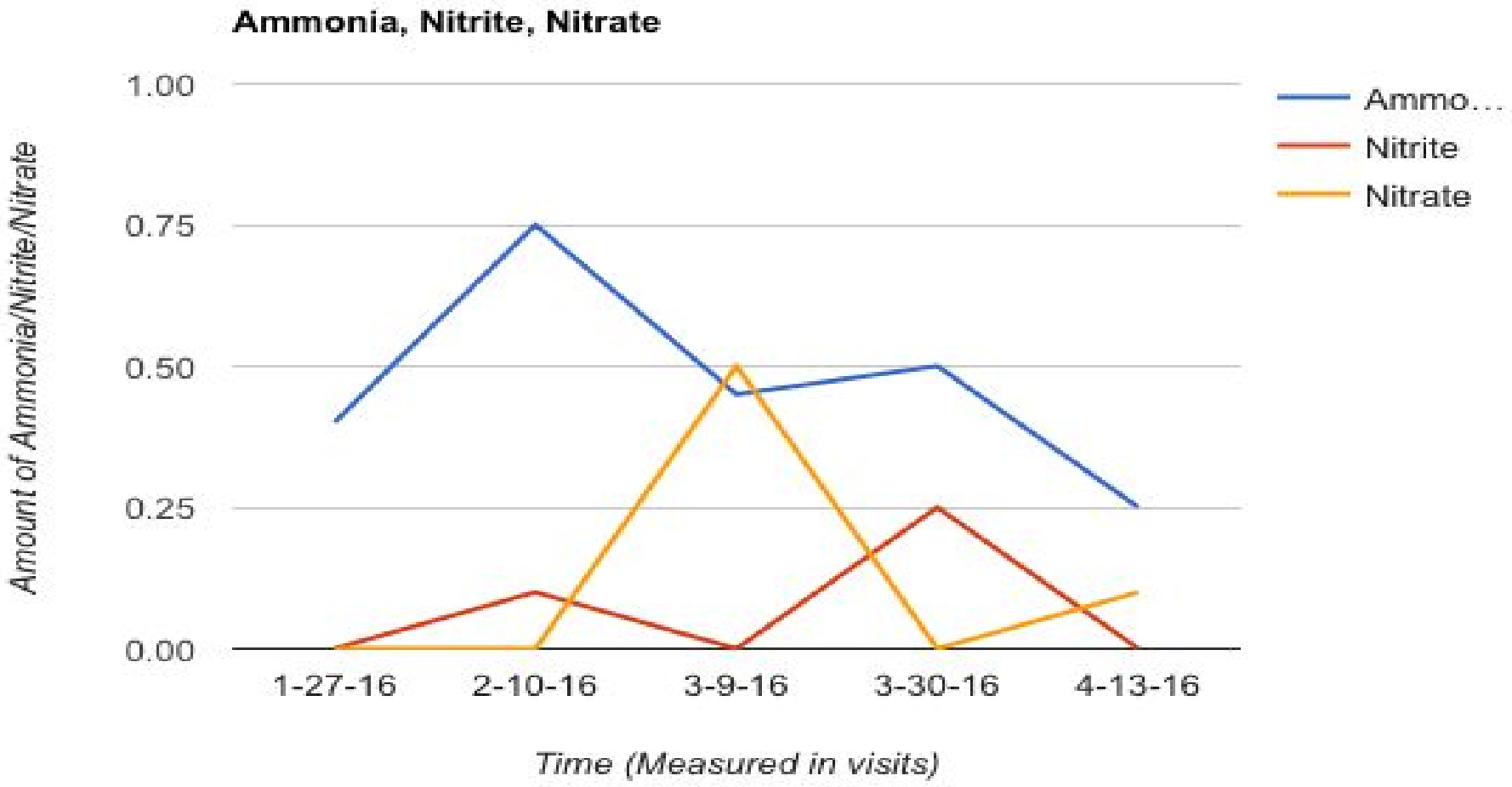
In the nitrogen cycle there are three nitrogen compounds which are ammonia, nitrite, and nitrate. These compounds are created through ammonification, nitrification, and dentrification. This allows ammonia to turn into nitrite from meshing with bacteria, and allows nitrite to turn into nitrate. These compounds all affect wildlife at alewife and are produced by the wildlife there as well. For example, ammonia can be produced by amino acids from dead animals, and high nitrate levels cause algal issues.

GROUP NAME Waterbenders

Field Water Quality

Date	Type of Test	Temperature (C)	Salinity	Ammonia	Nitrite	Nitrate	pH (solution test)	pH (strip test)	Dissolved Oxygen	Other
1/27/16		38.1	0	.40	0	0	7.2	6.4	7.7	1/27/16
2/10/16		40.0	15	0.75	0	0	6.6	6.7		
3/9/16		50.9 F	5	0.25-0.5	0	5	7.6	6.5	6.5	
3/30/16		39.9	8	.50	.25	0	6	6.5	didn't Work	metal: <10
4/13/16		47.7: river 39.6: Pond	0	0.25	0	0	6		9 river 10 pond-a little odd, let's check the calibration again	metal: <10
Thursday 19 2016		73.5							14.5	

Here is a graph of Ammonia, Nitrate and Nitrite. Ammonia is a colorless gas that is formed from Hydrogen and Nitrogen. The chemical formula is NH_3. Ammonia can be highly toxic. It comes from the Nitrogen Cycle and is caused by dead things such as animals, waste and gases. Nitrate and Nitrite are also gases but are not toxic and also come from the Nitrogen cycle and help with things like photosynthesis and plants and trees.


Ammonia, Nitrite, Nitrate
1.00
0.75
0.50
0.25
0.00
Amount of Ammonia/Nitrite/Nitrate
1-27-16
2-10-16
3-9-16
3-30-16
4-13-16
Time (Measured in visits)
Ammo…
Nitrite
Nitrate